United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
Texas Agricultural
Experiment Station
and Texas State
Soil and Water
Conservation Board

Soil Survey of Houston County, Texas

How to Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

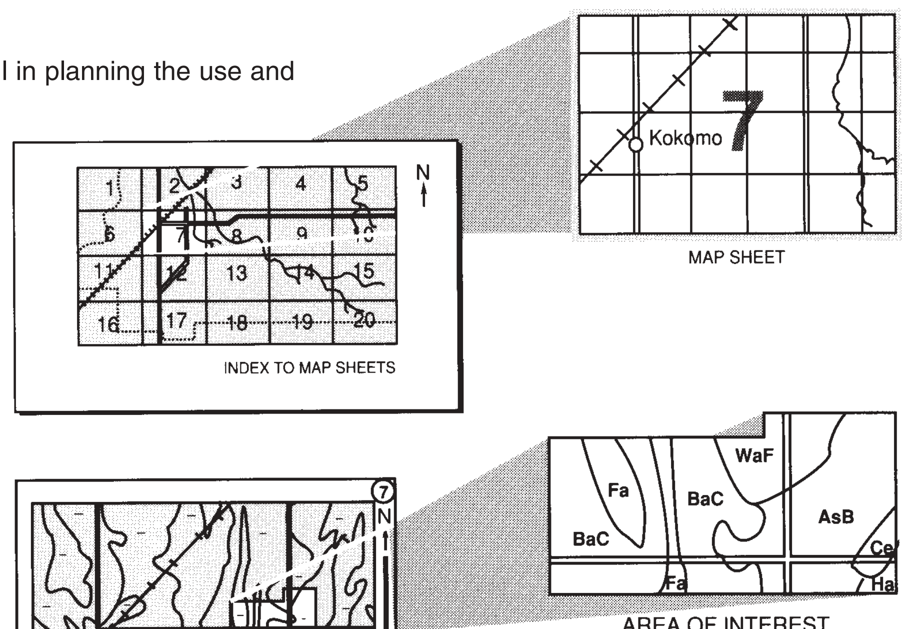
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1993. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1993. This survey was made cooperatively by the Natural Resources Conservation Service, the Texas Agricultural Experiment Station, and the Texas State Soil and Water Conservation Board. The survey is part of the technical assistance furnished to the Davy Crockett-Trinity Soil and Water Conservation Districts.

Cover: Because of the gently undulating to steep topography and adequate rainfall, lake and pond sites for recreation, livestock, and wildlife are available throughout Houston County.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 2002

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

John P. Burt
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Houston County, Texas

By Levi Steptoe, Jr., Natural Resources Conservation Service

Fieldwork by Levi Steptoe, Jr., Lynn D. Gray, Joseph Castille, and Fredrick Schrank, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Texas Agricultural Experiment Station and the Texas State Soil and Water Conservation Board

This soil survey updates the survey of Houston County published in 1903. It provides additional information and has larger maps, which show the soils in greater detail.

HOUSTON COUNTY is in the east-central part of Texas (fig. 1). It lies about 140 miles north of the Gulf of Mexico and about 80 miles west of the Louisiana State line. It consists of 789,978 acres of land and 1,664 acres of water. The county is irregular in outline. The Neches River forms the eastern boundary, which separates the county from Angelina and Cherokee Counties. The Trinity River forms the western boundary, which separates the county from Leon and Madison Counties. It is bordered by Anderson County on the north and Trinity and Walker Counties on the south.

Houston County is in the Western Coastal Plain major land resource area (East Texas Timberland). The topography of the area is nearly level to steep. The area has well defined drainage patterns and is dissected by many streams.

Timber, livestock, cotton, small grain, and peanut farming are the major enterprises in the area. About 54 percent of the survey area is used as woodland, 34 percent as pasture and hayland, 10 percent as cropland, and the remaining 2 percent is urban or built-up areas or areas of water.

The soils formed under forest vegetation in a humid environment. Most soils are light colored and medium to low in natural fertility.

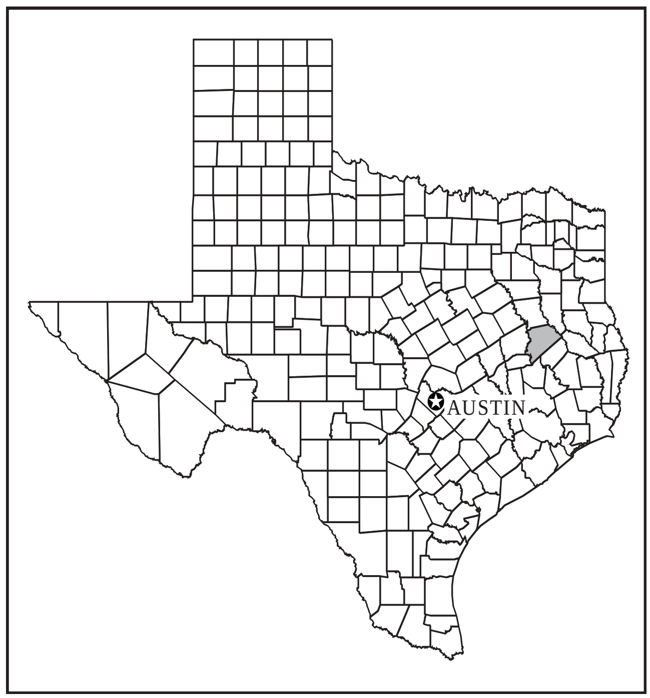


Figure 1.—Location of Houston County in Texas.

General Nature of the County

This section briefly discusses settlement and population, agriculture, natural resources, and climate of the county.

Settlement and Population

Eliza Bishop, Houston County historian, helped prepare this section.

Houston County was created during the Republic of Texas in 1837. It can be identified with the rich growing croplands in central east Texas and the rolling wooded hills in northeast Texas.

In 1690, the first Spanish outpost mission was built in what is presently northeast Houston County. The mission served the Indian residents called “Tejas” (friends) from their greeting. The Mission San Francisco de Los Tejas signaled Spanish rule and suspected French encroachment.

In the following year, 1691, El Camino Real was blazed to link the Spanish colonial settlements along the Rio Grande with the new missions in the northern part of the territory. Spanish explorers, missionaries, traders, and armies traveled through the vicinity.

Indians were much in evidence during the 1830’s. Kickapoos and Ionis shared the area with the Haisaini Federation (Caddos).

Impresarios working with the Spanish rulers began colonization. The Mexican government, which followed, awarded many pioneer settlers land grants. These pioneers settled in the area west of Nacogdoches County along the Neches River and over to the Trinity River. Some 110 settlers petitioned the Congress of the Republic of Texas on April 22, 1837, asking that a county be created from Nacogdoches. President Sam Houston signed the Congressional Act on June 12, 1837, and the first county created under the new Republic of Texas was named for him. The size of Houston County was three times that of present, and it included today’s Trinity, Anderson, and Henderson Counties. The present 1,237 square mile county area, which was established in 1850, is bounded by the Neches River on the east and the Trinity River on the west.

Churches and schools came with the pioneers who established them as one structure. The first college of the Republic of Texas was Trinity College at Old Alabama on the banks of the Trinity River. The college was chartered in 1841. There was also an academy at Augusta in 1850 and Steele’s Academy near the present community of Pennington.

In 1874, the International and Great Northern Railroad was built through the county, bringing it in closer touch with larger markets. Communities sprung up along the railroad every five to six miles. Three of them—Grapeland, Latexo and Lovelady—became incorporated towns, with Crockett also along the railroad. Kennard was the fifth town incorporated.

The centrally located community of Crockett was selected as the county seat and was incorporated on December 29, 1837. The town was named for the Tennessee scout, David Crockett, who camped near the area enroute to join the freedom fight at the Alamo in 1836.

Fifty-three other communities joined the five incorporated towns. The State of Texas celebrated a sesquicentennial for the state in 1986 and for Houston County in 1987. The county population was 21,375 in 1990.

Agriculture

Stan Murff, district conservationist, Natural Resources Conservation Service, Crockett, Texas, helped prepare this section.

Cotton was the major crop from the 1840’s to the 1960’s. The Civil War brought the first major change for the plantations and focused attention on the rich virgin pine timberlands in the eastern part of the county.

One of the largest sawmill operations west of the Mississippi River, The Four C Mill, was established in the Ratcliff area during the 1900’s. The mill ran for nearly 20 years until the 120,000 acres of virgin pine timber was cut over. The Civilian Conservation Corps replanted this area.

Other economic changes in Houston County since 1920 have prompted diverse changes in the development of agriculture in the county. For example, farming was the primary source of income for many years and continues to be one of the major land uses today. However, livestock production is now the leading agriculture enterprise in the county, with cow-calf operations representing the majority of the industry. Income from cattle production alone makes up approximately 50 to 55 percent of the total agricultural income for Houston County each year. Houston County ranks near the top in beef cattle production in Texas.

In Houston County, timber production, both pine and hardwood, ranks second in terms of agricultural income. Approximately 423,000 acres is devoted to timber production and owned by individual landowners, large timber companies, and the U.S. Forest Service. Most of the income generated by timber sales is from the sale of pine timber.

Houston County is one of the few remaining east Texas counties with a substantial row crop program. Major crops presently being grown include cotton, grain sorghum, peanuts, corn, and watermelons. A considerable acreage of small grains, including oats, wheat, and rye is also planted each year, but primarily for grazing and erosion control.

On a smaller scale, Houston County agriculture

includes dairy, truck farming, fish production, and fruit and pecan production.

Natural Resources

Soil is the most important natural resource in Houston County. Livestock, timber, and cropland farming are the main sources of income in the county.

Woodland is an important natural resource in the county. Landowners produce both pine and hardwood. Pine is sold for pulpwood, posts, crossties, and other wood products. Mature pine stands are sold for saw timber. Hardwood forests are cut mainly for crossties, pulpwood, or firewood.

Lignite coal mining for energy production was an important natural resource in the southern part of the county in the past and may be again in the future. The main oil and gas fields are the Kittrell, Bakerspring, and Fort Trinidad fields in the southern part of the county and the Navarro and Grapeland fields in the northern part of the county; however, wells are in production throughout the county.

Water is an important natural resource. Houston County Lake, in the west-central part of the county, provides water for the cities of Crockett and Grapeland, as well as fishing and recreational activities. The Trinity River, Neches River, and numerous smaller streams, creeks, farm ponds, and lakes provide abundant water supplies for the county.

Fish and wildlife are other important natural resources in Houston County. Most areas of the county are leased for deer hunting, which provides added income to landowners.

Climate

Prepared by the Natural Resources Conservation Service Climatic Data Access Facility, Portland, Oregon.

Houston County is hot in summer but cool in winter when an occasional surge of cold air causes a sharp drop in otherwise mild temperatures. Rainfall is uniformly distributed throughout the year, reaching a slight peak in spring. Snowfall is infrequent. Annual total precipitation is normally adequate for cotton, feed grains, and small grains.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Crockett in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 48 degrees F and the average daily minimum temperature is 36 degrees. The lowest temperature on record, which occurred at Crockett on December 24, 1989, is 0 degrees. In summer, the average temperature is 81 degrees. The highest recorded temperature, which occurred at Crockett on August 18, 1909, is 114 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 42 inches. Of this, about 22 inches, or 52 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 7.58 inches at Crockett on October 31, 1941. Thunderstorms occur on about 48 days each year, and most occur in May.

The average seasonal snowfall is about 0.9 inches. The greatest snow depth at any one time during the period of record was 1 inch. On the average, 2 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 10 inches.

The average relative humidity in midafternoon is about 51 percent. Humidity is higher at night, and the average at dawn is about 82 percent. The sun shines 65 percent of the time possible in summer and 47 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 13 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the

geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

Nearly level to steep, sandy, clayey, and loamy soils on uplands

The map units in this group make up about 68 percent of the county. The Alto, Betis, Cuthbert, Darco, Etoile, Fuller, Herty, Keltys, Kirvin, Kurth, Lilbert, Moswell, Moten, Penning, Sacul, Trawick, and Woodtell soils are dominant in this group. These soils developed in sandy, loamy, and clayey sediments of the Queen City Sand, Cook Mountain, Manning, Sparta Sand, Weches, and Yegua geological formations. The landscape is undulating to rolling with some areas slightly concave to convex and steep escarpments. Adapted grasses are mainly improved bermudagrass and bahiagrass with weeping lovegrass on the sandy soils. Fertilizer, lime, and rotational grazing are essential for good yields. Dominant pine trees are loblolly and shortleaf, and dominant hardwood trees are sweetgum, hickory, post oaks, southern red oaks, and white oaks.

1. Kurth-Fuller-Keltys

Nearly level to moderately sloping, moderately well drained and somewhat poorly drained soils that have a loamy subsoil; in pine forest

Setting

Landform: Uplands
Landform position: Kurth—convex stream divides and side slopes; Fuller—slightly concave toeslopes and footslopes; Keltys—smooth to slightly convex stream divides and side slopes (fig. 2)
Distinctive landform features: Yegua Formation
Slope: 0 to 8 percent

Composition

Percent of the survey area: 14 percent
Kurth and similar Kirvin and Cuthbert soils—46 percent
Fuller and similar Alazan, Moten, and Penning soils—22 percent
Keltys and similar soils—9 percent
Minor soils—23 percent (includes Herty, Iulus, Koury, Lovelady, Moswell, Multey, and Pophers soils)

- Herty and Moswell soils have more clay in the subsoil and a thinner surface layer than Keltys and Kurth soils
- Iulus, Koury, and Pophers soils are on flood plains of creeks
- Lovelady soils have a thick sandy surface layer and are in slightly higher landscape positions
- Multey soils are on mounded terraces

Typical Profile

Kurth

Surface layer: Grayish brown fine sandy loam
Subsurface layer: Pale brown to light yellowish brown fine sandy loam
Subsoil layer: Upper part—brownish yellow to strong brown clay loam; lower part—light brownish gray clay loam
Underlying layer: Grayish brown mudstone with dark red masses of iron accumulation

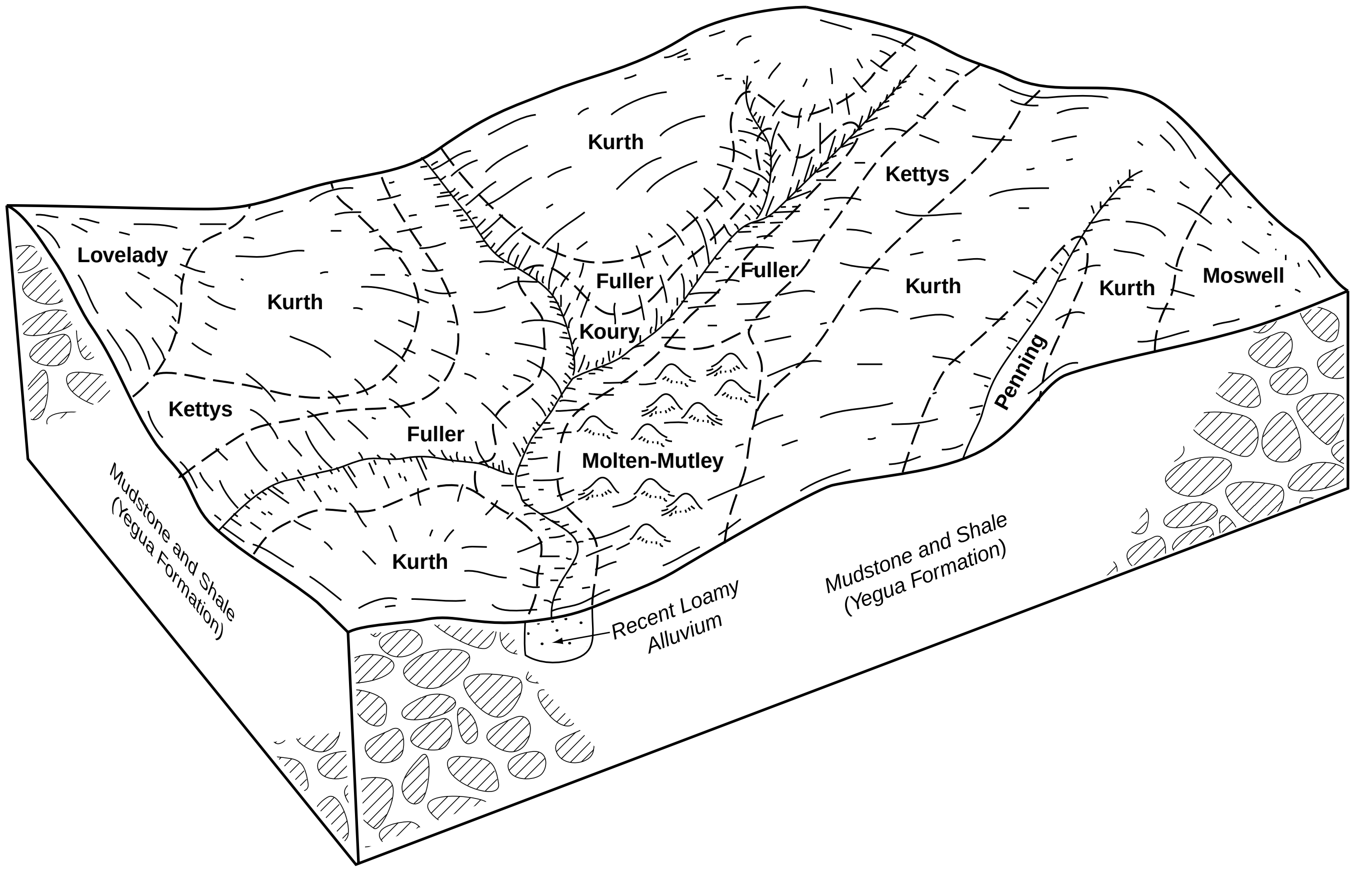


Figure 2.—Typical pattern of soils and parent material in the Kurth-Fuller-Keltys general soil map unit.

Fuller

Surface layer: Grayish brown fine sandy loam
Subsurface layer: Light brownish gray fine sandy loam with streaks of grayish brown loam in the lower part
Subsoil layer: Grayish brown loam to clay loam with very pale brown streaks
Underlying layer: Light brownish gray mudstone with texture of clay loam

Keltys

Surface layer: Dark grayish brown fine sandy loam
Subsurface layer: Brown or very pale brown fine sandy loam
Subsoil layer: Upper part—yellowish brown fine sandy loam with yellowish brown masses of iron accumulation and light brownish gray streaks; middle part—light brownish gray fine sandy loam to loam and yellowish brown loam; lower part—olive brown clay loam with strong brown masses of iron accumulation and light brownish gray streaks
Underlying layer: Pale olive clay loam to light brownish gray mudstone with texture of clay

Soil Properties and Qualities

Kurth

Depth class: Very deep
Drainage class: Moderately well drained
Flooding: None
Permeability: Moderately slow
Slope: Very gently sloping to moderately sloping

Fuller

Depth class: Deep
Drainage class: Somewhat poorly drained
Flooding: None
Permeability: Very slow
Slope: Nearly level to very gently sloping

Keltys

Depth class: Deep
Drainage class: Moderately well drained

Flooding: None
Permeability: Moderate
Slope: Very gently sloping to moderately sloping

Land Use

Dominant uses: Woodland

Other uses: Pastureland; a few areas are used as cropland

Pasture and hayland

Suitability: Well suited or moderately well suited
Adapted plants: Improved bermudagrass and bahiagrass
Management concerns: Fertilizer, lime, and rotational grazing are needed for sustained yields

Woodland

Suitability: Well suited
Common trees: Native pines and mixed hardwoods; loblolly pine is the dominant species
Management concerns: Lack of moisture during the summer months; generally, pine seedlings are easy to plant

2. Cuthbert-Kirvin-Lilbert

Very gently sloping to steep, well drained, loamy soils that have a clayey or loamy subsoil; in pine-hardwood forest

Setting

Landform: Uplands
Landform position: Cuthbert—side slopes; Kirvin—convex ridges and knolls; Lilbert—convex stream divides (fig. 3)
Distinctive landform features: Cook Mountain and Sparta Formations
Slope: 2 to 35 percent

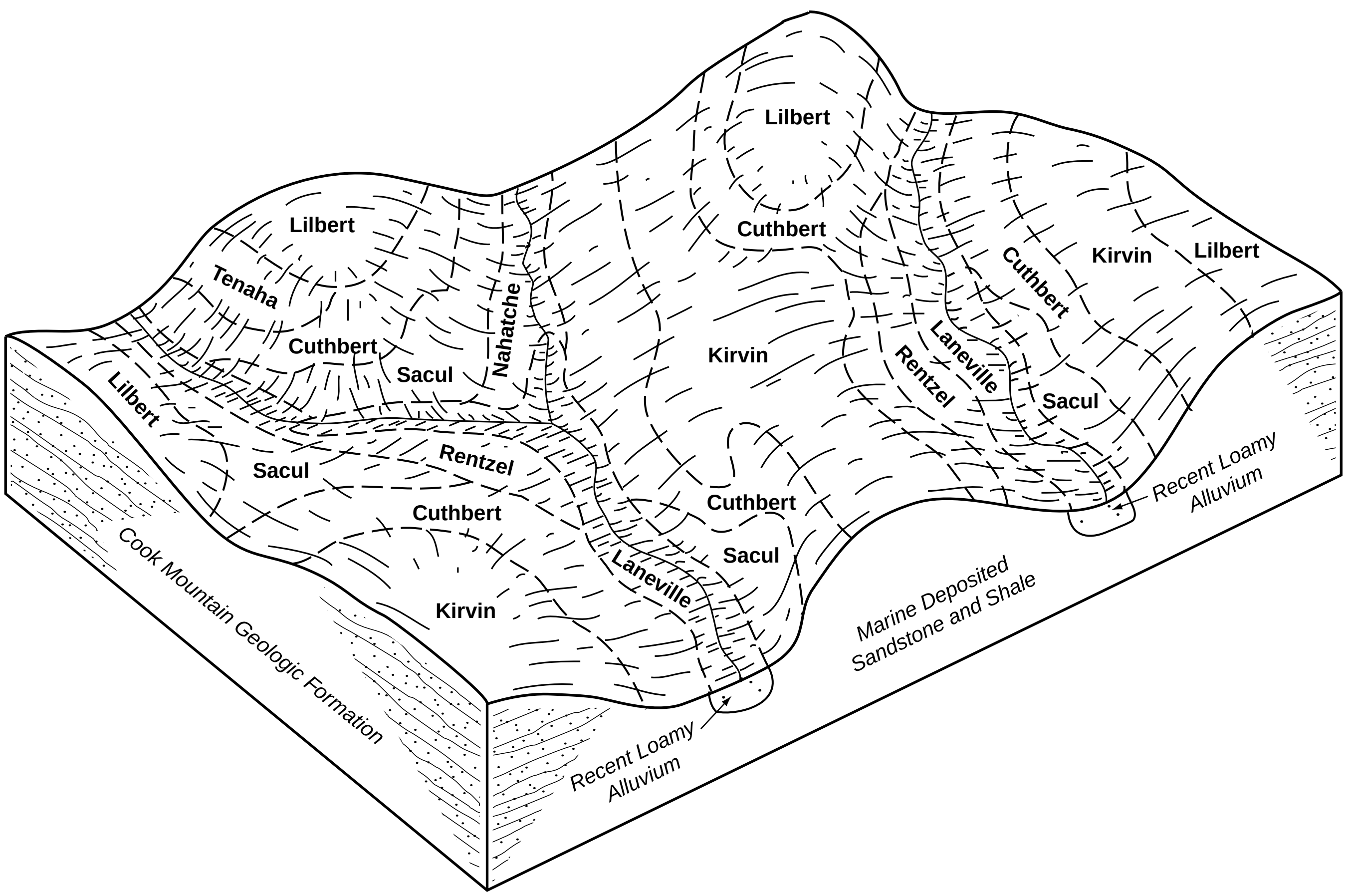


Figure 3.—Typical pattern of soils and parent material in the Cuthbert-Kirvin-Lilbert general soil map unit.

Composition

Percent of the survey area: 12 percent
Cuthbert and similar soils—30 percent
Kirvin and similar Bowie and Latex soils—26 percent
Lilbert and similar Tenaha soils—15 percent
Minor soils—29 percent (includes Darco, Iulus, Laneville, Lilbert, Nahatche, Rentzel, Sacul, and Woodtell soils)

- Darco soils are on strongly sloping side slopes
- Iulus, Laneville, and Nahatche soils are on flood plains of creeks
- Lilbert soils are on ridges and shoulder slopes
- Rentzel soils are at the head of drainageways or along poorly defined drainageways and toeslopes
- Sacul soils are on gently sloping, slightly concave head of drainageways and side slopes immediately above drainageways
- Woodtell soils are on very gently sloping, broad, smooth areas and strongly sloping side slopes

Typical Profile

Cuthbert

Surface layer: Dark brown gravelly fine sandy loam
Subsoil layer: Red clay with gray shale fragments
Underlying layer: Stratified red and brownish yellow sandstone with thin layers of light gray shale

Kirvin

Surface layer: Brown fine sandy loam
Subsurface layer: Very pale brown fine sandy loam
Subsoil layer: Upper part—dark red to red clay with yellowish brown mottles; lower part—red sandy clay with yellowish brown and dark red mottles
Underlying layer: Stratified red sandstone with texture of fine sandy loam and grayish brown shale

Lilbert

Surface layer: Brown loamy fine sand
Subsurface layer: Very pale brown loamy fine sand
Subsoil layer: Upper part—strong brown sandy clay loam; lower part—dark red sandy clay loam

Soil Properties and Qualities

Cuthbert

Depth class: Moderately deep
Drainage class: Well drained
Flooding: None
Permeability: Moderately slow
Slope: Moderately sloping to steep

Kirvin

Depth class: Deep
Drainage class: Well drained
Flooding: None
Permeability: Moderately slow
Slope: Very gently sloping to moderately sloping

Lilbert

Depth class: Very deep
Drainage class: Well drained
Flooding: None
Permeability: Moderately slow
Slope: Gently sloping

Land Use

Dominant uses: Woodland

Other uses: Pastureland; a few areas are used as cropland

Pasture and hayland

Suitability: Moderately well suited to poorly suited
Adapted plants: Common bermudagrass, improved bahiagrass, and coastal bermudagrass
Management concerns: Clayey subsoil and slopes; fertilizer, lime, and rotational grazing are needed for sustained yields

Woodland

Suitability: Moderately suited
Common trees: Woodlands are dominated by either loblolly pine or shortleaf pine; pine and mixed hardwood areas are normally dominated by sweetgum, hickory, and oaks, such as post oak, southern red oak and white oak
Management concerns: Clayey subsoil and moderate available water capacity

3. Lilbert-Betis-Darco

Very gently sloping to moderately steep, somewhat excessively drained and well drained soils that have a sandy or loamy subsoil; in pine-hardwood forest

Setting

Landform: Uplands
Landform position: Lilbert and Betis—stream divides; Darco—stream divides and side slopes
Distinctive landform features: Queen City Sand and Sparta Sand Formations; seeps and springs are common on the lower parts of side slopes
Slope: 1 to 15 percent

Composition

Percent of the survey area: 11 percent
Lilbert and similar Tenaha soils—28 percent
Betis and similar Grapeland and Tonkawa soils—24 percent
Darco and similar soils—24 percent
Minor soils—24 percent (includes Bowie, Cuthbert, Iulus, Naconiche, Rentzel, and Trawick soils)

- Bowie soils are on very gently sloping toeslopes
- Cuthbert soils are on side slopes
- Iulus and Naconiche soils are on nearly level flood plains
- Rentzel soils are along drainageways
- Trawick soils are on steep side slopes

Typical Profile

Lilbert

Surface layer: Brown loamy fine sand
Subsurface layer: Very pale brown loamy fine sand
Subsoil layer: Upper part—strong brown sandy clay loam; lower part—dark red sandy clay loam

Betis

Surface layer: Dark yellowish brown loamy fine sand
Subsurface layer: Yellowish brown loamy fine sand
Subsoil layer: Upper part—yellowish brown loamy fine sand with pockets of very pale brown fine sand; lower part—very pale brown loamy fine sand with thin bands of light brown or strong brown fine sandy loam

Darco

Surface layer: Brown loamy fine sand
Subsurface layer: Light yellowish brown and pale brown loamy fine sand
Subsoil layer: Upper part—strong brown sandy clay loam; lower part—variegated red, strong brown, light brownish gray, and light gray sandy clay loam

Soil Properties and Qualities

Lilbert

Depth class: Very deep
Drainage class: Well drained
Flooding: None
Permeability: Moderately slow
Slope: Gently sloping

Betis

Depth class: Very deep
Drainage class: Somewhat excessively drained
Flooding: None
Permeability: Rapid
Slope: Gently sloping

Darco

Depth class: Very deep
Drainage class: Somewhat excessively drained
Flooding: None
Permeability: Moderate
Slope: Very gently sloping to moderately steep

Land Use

Dominant uses: Woodland

Other uses: Pasture and hayland; some areas are used as cropland

Pasture and hayland

Suitability: Moderately well suited
Adapted plants: Improved bermudagrass
Management concerns: Droughtiness; pastures require light applications of fertilizer and lime at frequent intervals for best production; legumes, such as vetch, crimson clover, and singletary pea overseeded into the grass lengthens the grazing season and improves the soil tilth; fertilizer, lime, and rotational grazing are needed for sustained yields

Woodland

Suitability: Moderately well suited
Common trees: Loblolly pine and shortleaf pine are the dominant species with sweetgum, hickory, and oaks, such as post oak, southern red oak, and white oak intermingled; longleaf uniola, pinehill bluestem, purpletop, and diverse shrubs are the main plants in the understory
Management concerns: Low available water capacity which causes seedling mortality and slow tree growth

4. Fuller-Penning-Herty

Nearly level to very gently sloping, well drained to somewhat poorly drained soils that have a loamy or clayey subsoil; in pine forest

Setting

Landform: Uplands
Landform position: Fuller—toeslopes and footslopes; Penning—toeslopes and drainageways; Herty—toeslopes and stream divides
Distinctive landform features: Yegua Formation
Slope: 0 to 3 percent

Composition

Percent of the survey area: 11 percent
Fuller and similar soils—40 percent
Penning and similar Alazan, Besner, Moten, and Multy soils—19 percent
Herty and similar Etoile and Moswell soils—18 percent
Minor soils—23 percent (includes Derly, Freestone, Keltys, Koury, Kurth, Lovelady, and Pophers soils)

- Derly and Freestone soils are on broad nearly level terraces
- Keltys soils are on gently sloping to sloping stream divides or side slopes
- Koury and Pophers soils are on flood plains of creeks
- Kurth and Lovelady soils are on gently sloping to moderately sloping smooth convex ridges or side slopes

Typical Profile

Fuller

Surface layer: Grayish brown fine sandy loam
Subsurface layer: Light brownish gray fine sandy loam with streaks of grayish brown loam in the lower part
Subsoil layer: Grayish brown loam to clay loam with very pale brown streaks
Underlying layer: Light brownish gray mudstone with texture of clay loam

Penning

Surface layer: Brown very fine sandy loam
Subsurface layer: Brown and pale brown very fine sandy loam
Subsoil layer: Upper part—yellowish brown and brownish yellow fine sandy loam and loam; lower part—brownish yellow and grayish brown sandy clay loam
Underlying layer: Light brownish gray shale with texture of clay

Herty

Surface layer: Dark grayish brown loam
Subsurface layer: Brown silt loam
Subsoil layer: Upper part—very dark grayish brown to dark grayish brown clay; lower part—dark grayish brown silty clay
Underlying layer: Olive mudstone with texture of clay loam

Soil Properties and Qualities

Fuller

Depth class: Deep
Drainage class: Somewhat poorly drained
Flooding: None
Permeability: Very slow
Slope: Nearly level to very gently sloping

Penning

Depth class: Deep
Drainage class: Moderately well drained
Flooding: None
Permeability: Moderate
Slope: Nearly level to very gently sloping

Herty

Depth class: Deep
Drainage class: Well drained
Flooding: None
Permeability: Very slow
Slope: Nearly level to very gently sloping

Land Use

Dominant uses: Woodland

Other uses: Pastureland; a few areas are used as cropland

Pasture and hayland

Suitability: Well suited or moderately well suited
Adapted plants: Improved bermudagrass and bahiagrass that can be overseeded to clover or vetch
Management concerns: Fertilizer, lime, and rotational grazing are needed for sustained yields

Woodland

Suitability: Well suited
Common trees: Native pines and mixed hardwoods; loblolly pine is the dominant species
Management concerns: Lack of moisture during the summer months; seedling mortality, especially on Fuller soils; and difficulty in reestablishing seedling after clearcutting and site preparation

5. Herty-Moswell-Fuller

Nearly level to moderately steep, well drained to somewhat poorly drained soils that have a clayey or loamy subsoil; in pine forest

Setting

Landform: Uplands
Landform position: Herty—toeslopes and stream divides; Moswell—side slopes and stream divides; Fuller—toeslopes and footslopes
Distinctive landform features: Yegua Formation
Slope: 0 to 15 percent

Composition

Percent of the survey area: 8 percent
Herty and similar soils—25 percent
Moswell and similar Etoile soils—24 percent
Fuller and similar Moten, Multy, and Penning soils—24 percent
Minor soils—27 percent (includes Keltys, Koury, Kurth, Lovelady, and Pophers soils)

- Keltys, Kurth, and Lovelady soils have a loamy subsoil and are in higher landscape positions; Lovelady soils also have a thick sandy surface layer
- Koury and Pophers soils are on flood plains of creeks

Typical Profile

Herty

Surface layer: Dark grayish brown loam
Subsurface layer: Brown silt loam
Subsoil layer: Upper part—very dark grayish brown to dark grayish brown clay; lower part—dark grayish brown silty clay
Underlying layer: Olive mudstone with texture of clay loam

Moswell

Surface layer: Dark grayish brown loam
Subsurface layer: Pale brown loam with light gray and strong brown relict iron depletions and masses of iron accumulation
Subsoil layer: Upper part—yellowish red clay with strong brown and pale brown relict iron depletions and masses of iron accumulation; lower part—red and light brownish gray clay with red relict masses of iron accumulation
Underlying layer: Horizontally bedded layers of light brownish gray, strong brown, and yellowish brown shale with texture of clay

Fuller

Surface layer: Grayish brown fine sandy loam
Subsurface layer: Grayish brown to light brownish gray loam
Subsoil layer: Dark grayish brown loam and grayish brown clay loam with very pale brown streaks
Underlying layer: Olive gray mudstone with texture of clay loam in the upper part

Soil Properties and Qualities

Herty

Depth class: Deep
Drainage class: Well drained
Flooding: None
Permeability: Very slow
Slope: Nearly level to very gently sloping

Moswell

Depth class: Deep
Drainage class: Well drained
Flooding: None
Permeability: Very slow
Slope: Very gently sloping to moderately steep

Fuller

Depth class: Deep
Drainage class: Somewhat poorly drained
Flooding: None
Permeability: Very slow
Slope: Nearly level to very gently sloping

Land Use

Dominant uses: Woodland

Other uses: Pastureland; a few areas are used as cropland

Pasture and hayland

Suitability: Moderately well suited
Adapted plants: Improved bermudagrass and bahiagrass that can be overseeded to clover or vetch
Management concerns: Fertilizer, lime, and rotational grazing are need for sustained yields

Woodland

Suitability: Moderately well suited
Common trees: Native pines and mixed hardwoods; loblolly pine is the dominant species
Management concerns: The potential for erosion increases with slope; therefore, care must be taken to avoid excessive uphill and downhill rutting on steeper sites

6. Woodtell-Etoile

Very gently sloping to moderately steep, well drained and moderately well drained soils that have a clayey subsoil; in hardwood-pine forest

Setting

Landform: Uplands
Landform position: Woodtell—stream divides and side slopes; Etoile—stream divides (fig. 4)
Distinctive landform features: Well defined drainage system; the underlying material is of the Stone City Formation, which is a member of the Cook Mountain geologic formation
Slope: 1 to 15 percent

Composition

Percent of the survey area: 8 percent
Woodtell and similar soils—33 percent
Etoile and similar Annona soils—24 percent
Minor soils—43 percent (includes Cuthbert, Freestone, LaCerda, Laneville, Latex, Sawlit, and Trawick soils)

- Cuthbert soils are on strongly sloping to moderately steep side slopes and have a clayey subsoil that is not as sticky or as plastic as that of Woodtell and Etoile soils
- Freestone soils are on nearly level to very gently sloping stream terraces
- LaCerda soils are clayey to the surface and are in similar landscape positions
- Laneville soils are on flood plains of creeks
- Latex soils are in slightly higher landscape positions or are on mounded terraces and have a loamy subsoil
- Sawlit soils are on nearly level mounded terraces
- Trawick soils are on strongly sloping to moderately steep side slopes

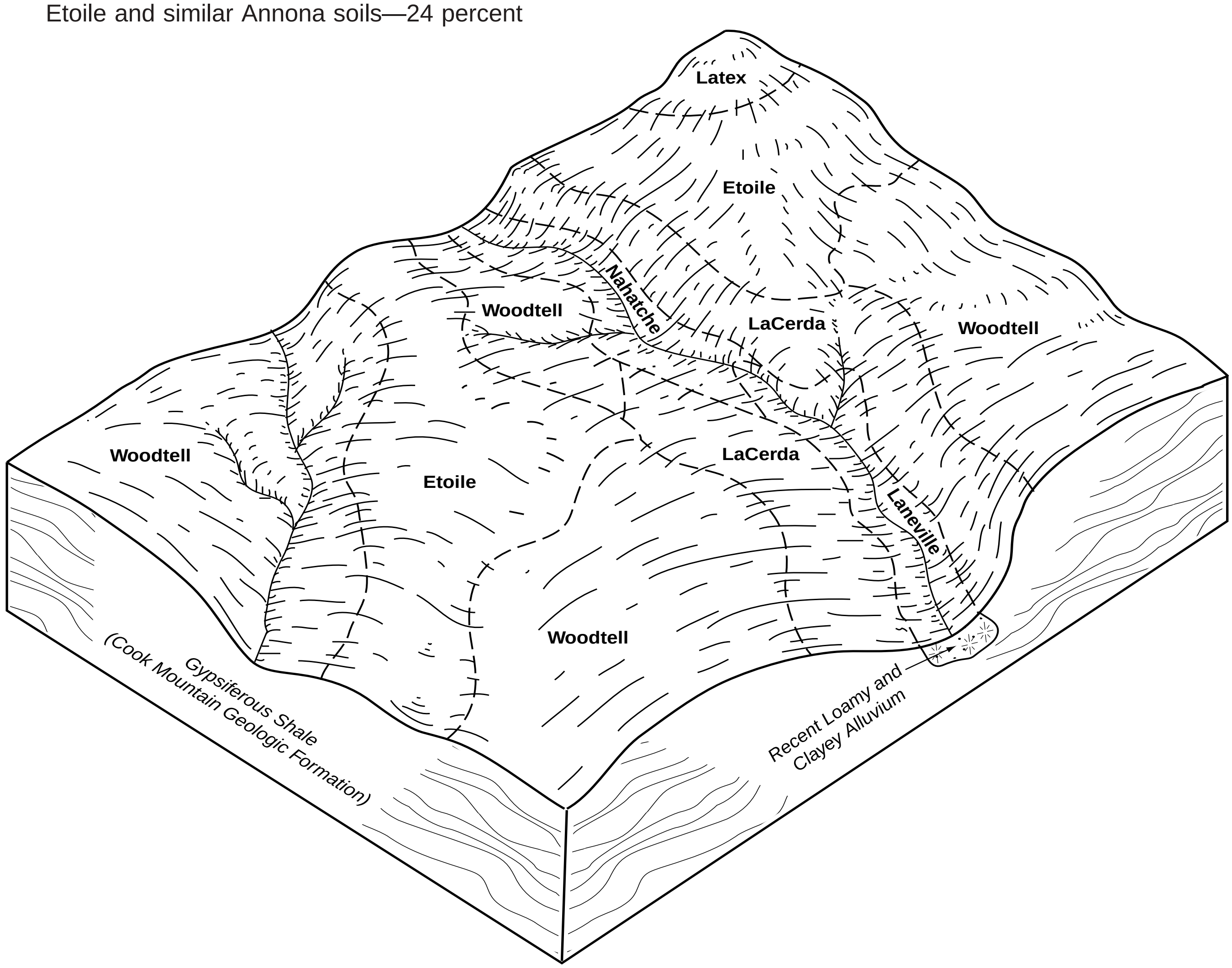


Figure 4.—Typical pattern of soils and underlying material in the Woodtell-Etoile general soil map unit.

Typical Profile

Woodtell

Surface layer: Very dark grayish brown very fine sandy loam
Subsoil layer: Upper part—red clay with pale brown and light brownish gray mottles; lower part—variegated red to dark red and light brownish gray clay
Underlying layer: Stratified light brownish gray shale with a texture of clay and strong brown soft sandstone with a texture of fine sandy loam

Etoile

Surface layer: Dark brown loam
Subsoil layer: Upper part—yellowish red to yellowish brown clay with yellowish red relict masses of iron accumulation; lower part—dark grayish brown to light brownish gray clay with brownish yellow relict masses of iron accumulation
Underlying layer: Layered light brownish gray, brown, and brownish yellow shale with texture of clay

Soil Properties and Qualities

Woodtell

Depth class: Deep
Drainage class: Well drained
Flooding: None
Permeability: Very slow
Slope: Very gently sloping to moderately steep

Etoile

Depth class: Deep
Drainage class: Moderately well drained
Flooding: None
Permeability: Very slow
Slope: Very gently sloping

Land Use

Dominant uses: Pastureland

Other uses: Woodland; a few areas are used as cropland

Pasture and hayland

Suitability: Moderately well suited
Adapted plants: Improved bermudagrass and bahiagrass that can be overseeded with legumes, such as white dutch clover, arrowleaf clover, or vetch
Management concerns: Fertilizer, lime, and rotational grazing are needed for sustained yields

Woodland

Suitability: Moderately well suited
Common trees: Native pines and mixed hardwoods; loblolly pine is the dominant species
Management concerns: As slopes increase, particularly on Woodtell soils, the potential for erosion increases; steps should be taken to avoid uphill and downhill rutting during harvest

7. Alto-Trawick

Very gently sloping to steep, well drained soils that have a loamy or clayey subsoil; in pine-hardwood forest.

Setting

Landform: Uplands
Landform position: Alto—stream divides; Trawick—knobs, ridges, and side slopes (fig. 5)
Distinctive landform features: The underlying material is weathered glauconitic materials and glauconitic greensand of the Weches Formation
Slope: 1 to 40 percent

Composition

Percent of the survey area: 4 percent
Alto and similar Elrose, Bowie, and Latex soils—39 percent
Trawick and similar Cuthbert and Kirvin soils—31 percent
Minor soils—30 percent (includes Chireno, Hannahatchee, Laneville, Lilbert, and Percilla soils

- Chireno soils are on nearly level old colluvial positions
- Hannahatchee and Laneville soils are on flood plains of creeks
- Lilbert soils are on nearly level to gently sloping knolls
- Percilla soils are on nearly level to depressional areas

Typical Profile

Alto

Surface layer: Brown fine sandy loam
Subsoil layer: Upper part—strong brown to yellowish brown sandy clay loam to clay loam with brownish yellow and red masses of iron accumulation; middle part—yellowish brown clay with brownish yellow and dark red masses of iron accumulation; lower part—dark yellowish brown gravelly clay to very gravelly clay with brownish yellow and dark red masses of iron accumulation

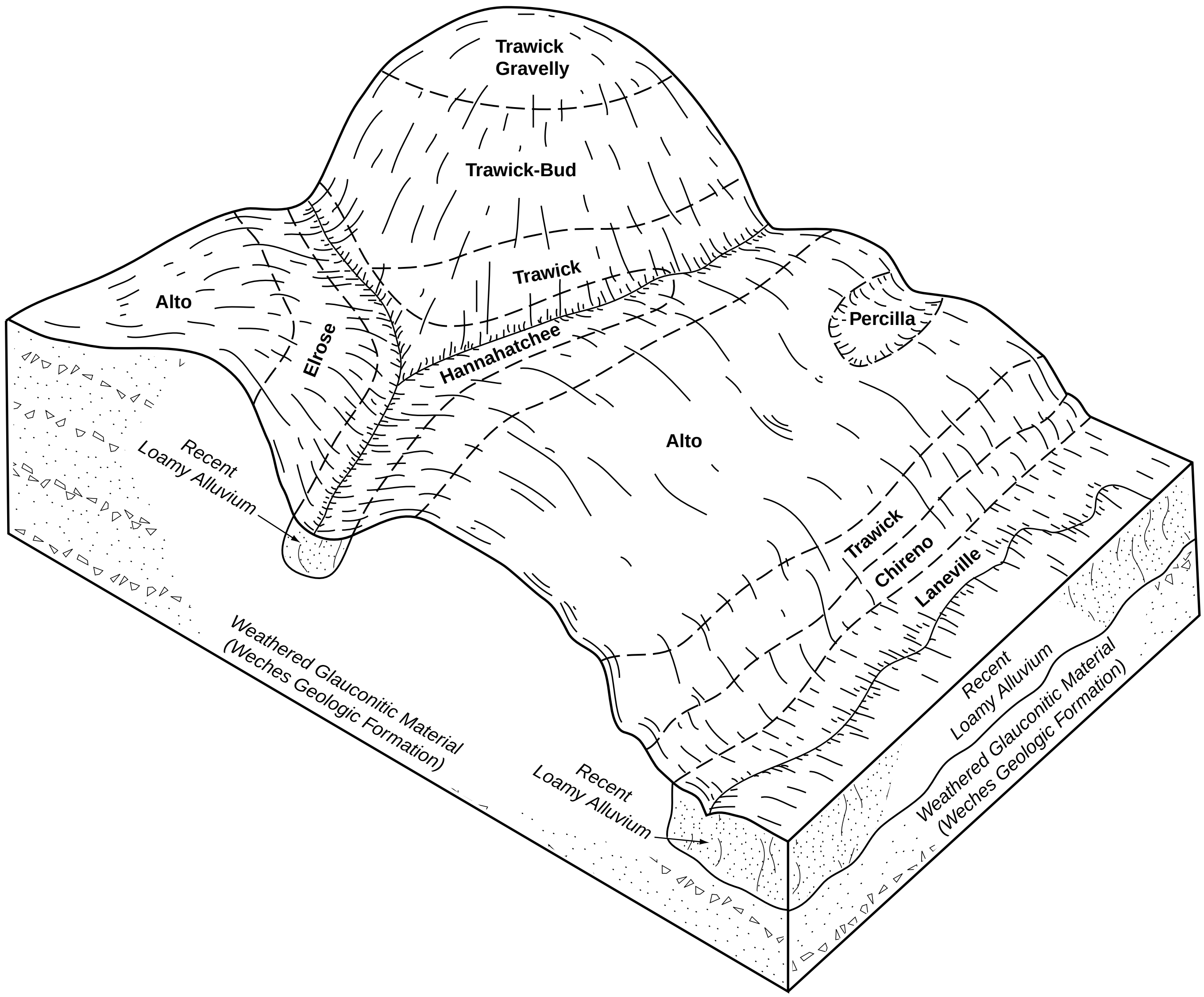


Figure 5.—Typical pattern of soils and parent material in the Alto-Trawick general soil map unit.

Underlying layer: Upper part—yellowish brown clay, weathered glauconitic materials with texture of loam to clay, and red pockets of silty clay; lower part—strong brown, yellowish brown, and light olive brown stratified glauconitic materials with texture of loam

Trawick

Surface layer: Dark reddish brown gravelly fine sandy loam
Subsoil layer: Dark red clay with brownish yellow and yellowish red mottles in the lower part
Underlying layer: Dark brown stratified glauconitic material with brownish yellow and dark red mottles

Soil Properties and Qualities

Alto

Depth class: Deep
Drainage class: Well drained
Flooding: None
Permeability: Moderately slow
Slope: Very gently sloping

Trawick

Depth class: Moderately deep
Drainage class: Well drained
Flooding: None
Permeability: Very slow
Slope: Very gently sloping to steep

Land Use

Dominant uses: Pastureland and woodland

Other uses: Some smoother areas are used as cropland

Pasture and hayland

Suitability: Moderately suited or moderately well suited
Adapted plants: Improved bermudagrass and bahiagrass that can be overseeded with legumes, such as arrowleaf clover or vetch
Management concerns: Overseeding legumes into the grass can help to extend the grazing season and improve the soil; fertilizer, lime, and rotational grazing are needed to maintain yields

Woodland

Suitability: Moderately well suited
Common trees: Loblolly pine and shortleaf pine are the dominant commercial trees; sweetgum, hickory, post oak, southern red oak, and white oak are the dominant hardwood trees
Management concerns: Clayey subsoil and steep slopes; in most areas, the native understory is grazed by livestock and game animals

Nearly level to gently sloping, loamy and clayey soils on Pleistocene terraces

The map units in this group make up about 15 percent of the county. Alazan, Eastham, Freestone, Garner, Hallsbluff, and Latex soils are dominant in this group. These soils developed in fluviatile terrace deposits ranging from clayey to loamy sediments. The landscape is mainly nearly level to very gently sloping and gently undulating, but it is strongly sloping along beveled edges of terraces (fig. 6).

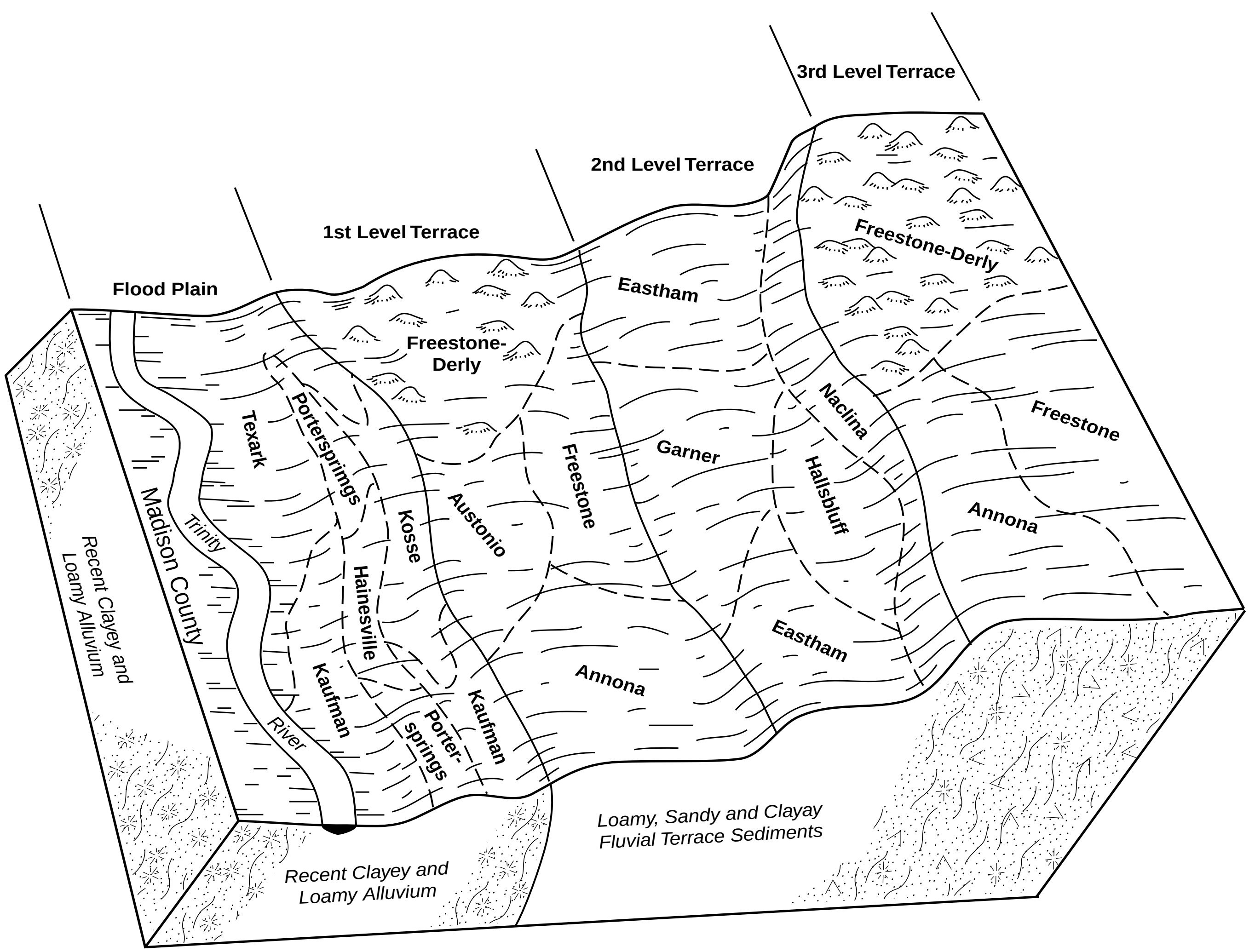


Figure 6.—Typical pattern of soils and parent material on terraces and along the flood plain of the Trinity River.

Improved grasses, such as coastal bermudagrass, bahiagrass, and fescue are suitable for pasture plants. Dominant trees are oaks, sweetgum, elms, and hackberry. Most soils in this group are well suited to crops, such as cotton, milo, peanuts, and vegetable truck crops. Fertilizer and lime are needed for sustained yields.

8. Freestone-Latex-Annona

Nearly level to very gently sloping, moderately well drained and well drained soils that have a loamy or clayey subsoil; in pine-hardwood forest

Setting

Landform: Uplands and stream terraces
Landform position: Freestone—toeslopes and mounds; Latex—toeslopes, mounds, stream divides, and knolls; Annona—toeslopes
Distinctive landform features: Drainageways are poorly defined
Slope: 0 to 3 percent

Composition

Percent of the survey area: 14 percent
Freestone and similar Alazan and Penning soils—38 percent
Latex and similar Alto, Attoyac, Bernaldo, and Sawlit soils—24 percent
Annona and similar Etoile and Woodtell soils—15 percent
Minor soils—23 percent (includes Austonio, Besner, Hainesville, Kosse, Mollville, and Portersprings soils)

- Austonio soils are loamy and are on very gently sloping to strongly sloping, beveled side slopes
- Besner soils are loamy and are on broad, nearly level to gently sloping terraces
- Hainesville soils are on sand ridges
- Kosse soils are on flood plains of creeks and small streams
- Mollville soils are loamy and wet and are on nearly level to slightly concave areas on terraces
- Portersprings soils are on nearly level terraces and are in slightly lower landscape positions

Typical Profile

Freestone

Surface layer: Dark brown fine sandy loam
Subsurface layer: Pale brown fine sandy loam
Subsoil layer: Upper part—brownish yellow sandy clay loam with dark red, gray, and light brownish gray masses of iron accumulation and iron depletions and pale brown to light gray streaks; lower part—variegated strong brown, yellowish red, red, dark reddish brown, and light brownish gray clay loam with light gray streaks

Latex

Surface layer: Very dark grayish brown loam
Subsoil layer: Upper part—strong brown or brownish yellow loam to clay loam; lower part—variegated dark red, yellowish brown, reddish yellow, yellowish red, and brown clay

Annona

Surface layer: Dark grayish brown loam
Subsurface layer: Brown loam with strong brown and light brownish gray mottles
Subsoil layer: Upper part—dark red clay with pale brown and light brownish gray relict iron depletions; lower part—variegated gray, dark reddish brown, brownish yellow, yellowish brown, light brownish gray, and brown clay to clay loam

Soil Properties and Qualities

Freestone

Depth class: Very deep
Drainage class: Moderately well drained
Flooding: None
Permeability: Slow
Slope: Nearly level to very gently sloping

Latex

Depth class: Very deep
Drainage class: Moderately well drained
Flooding: None
Permeability: Slow
Slope: Very gently sloping

Annona

Depth class: Very deep
Drainage class: Well drained
Flooding: None
Permeability: Very slow
Slope: Nearly level to very gently sloping

Land Use

Dominant uses: Pastureland

Other uses: Woodland; a few areas are used as cropland

Pasture and hayland

Suitability: Moderately well suited to very well suited
Adapted plants: Improved bermudagrass and bahiagrass that can be overseeded with legumes, such as crimson clover, white dutch clover, arrowleaf clover, or vetch
Management concerns: Fertilizer, lime, and rotational grazing are need for sustained yields

Woodland

Suitability: Well suited
Common trees: Native pines and mixed hardwoods; loblolly pine is the dominant species
Management concerns: No significant management problems

9. Eastham-Garner-Hallsbluff

Nearly level to gently sloping, well drained and moderately well drained soils that are clayey throughout; on savannas

Setting

Landform: Stream terraces
Landform position: Eastham and Garner—toeslopes; Hallsbluff—footslopes
Distinctive landform features: The underlying material is clayey fluvial deposits transported from sources upriver, mainly from soils formed in Cretaceous limestone and marl
Slope: 0 to 5 percent

Composition

Percent of the survey area: 1 percent
Eastham and similar soils—34 percent
Garner and similar soils—19 percent
Hallsbluff and similar soils—11 percent
Minor soils—36 percent (includes Annona, Derly, Freestone, Hainesville, Kaufman, Kosse, Portersprings, and Texark soils)

- Annona soils are in landscape positions similar to those of the Eastham and Garner soils; Annona soils also have a loam surface layer and dark red clay upper subsoil
- Derly soils are in slightly concave areas
- Freestone soils are on gently sloping and gently undulating mounded terraces
- Hainesville soils are on slightly higher sandy ridges
- Kaufman, Kosse, and Texark soils are on flood plains of the Trinity River
- Portersprings soils are on nearly level terraces in slightly lower landscape positions

Typical Profile

Eastham

Surface layer: Very dark gray clay
Subsoil layer: Upper part—very dark gray to gray clay with light olive brown relict masses of iron accumulation; lower part—grayish brown to gray clay with light olive brown or yellowish brown relict masses of iron accumulation

Garner

Surface layer: Very dark gray clay
Subsoil layer: Upper part—dark gray clay with yellowish brown, strong brown, very dark gray, dark gray, and gray relict masses of iron accumulation and iron depletions; lower part—dark grayish brown to gray clay with light olive brown, grayish brown, strong brown, and brownish yellow relict masses of iron accumulation

Hallsbluff

Surface layer: Upper part—very dark grayish brown clay loam; lower part—very dark grayish brown silty clay
Subsoil layer: Upper part—very dark grayish brown silty clay with light olive brown relict masses of iron accumulation; lower part—olive or light olive brown to yellowish brown clay with dark grayish brown, very dark gray, and light brownish gray relict iron depletions

Soil Properties and Qualities

Eastham

Depth class: Very deep
Drainage class: Moderately well drained
Flooding: None
Permeability: Very slow
Slope: Nearly level to very gently sloping

Garner

Depth class: Very deep
Drainage class: Moderately well drained
Flooding: None
Permeability: Very slow
Slope: Nearly level

Hallsbluff

Depth class: Very deep
Drainage class: Well drained
Flooding: None
Permeability: Very slow
Slope: Gently sloping

Land Use

Dominant uses: Pastureland

Other uses: Woodland; a few areas are used as cropland

Pasture and hayland

Suitability: Moderately well suited
Adapted plants: Improved bermudagrass and bahiagrass that can be overseeded with legumes, such as white dutch clover, arrowleaf clover, or vetch
Management concerns: Clayey surface layer limits water intake and storage; fertilizer, lime, and rotational grazing are needed for sustained yields

Woodland

Suitability: Moderately well suited
Common trees: Loblolly pine and hardwoods
Management concerns: Eastham and Hallsbluff—best suited for the management of hardwood trees only; Garner—can be managed for pine and hardwood trees; some sites, however, may have a high pH, which will limit the suitability for pine trees; clayey surface may restrict equipment use during harvesting operations; harvesting operations should be limited to the drier months to prevent excessive rutting and to maintain normal drainage

Nearly level, loamy and clayey soils on flood plains

The map units in this group make up 17 percent of the county. The Hannahatchee, Kaufman, Koury, Laneville, Nahatche, Pophers, and Texark soils are dominant in this group. These soils developed in loamy and clayey sediments of Recent age. The landscape is nearly level flood plains. Stream channels in these bottomland areas are crooked and meandering. This causes sluggish movement of water and, in some cases, annual flooding (fig. 7).

These soils are used as cropland, pastureland, and woodland. Pine and mixed hardwoods are native on Hannahatchee, Koury, and Laneville soils. Hardwoods are dominant on Nahatche and Pophers soils. Kaufman and Texark soils are important cropland soils, mainly for cotton and milo. Yields are usually very good in these slightly wet soils when crops can be planted at normal seeding dates. Most improved pastures on these soils are vegetated with fescue and bahiagrass that can be overseeded with legumes.

10. Pophers-Koury

Nearly level, moderately well drained and somewhat poorly drained, loamy soils that have a loamy or clayey subsoil; in hardwood-pine forest

Setting

Landform: Flood plains
Landform position: Pophers—bottomland flats and mounds; Koury—bottomland flats
Distinctive landform features: Along major streams over the Yegua Formation
Slope: 0 to 1 percent

Composition

Percent of the survey area: 7 percent
Pophers and similar Ozias soils—37 percent
Koury and similar soils—23 percent
Minor soils—40 percent (includes Fuller, Herty, Keltys, Kurth, Laneville, Moten, Multey, Nahatche, and Penning soils)

- Fuller soils are in slightly higher landscape positions
- Herty soils are in higher landscape positions and have a clayey subsoil
- Keltys and Kurth soils are in higher landscape positions and are well drained
- Laneville soils are not as wet and have a loam surface layer with dense clay underlying material
- Moten and Multey soils are in slightly higher landscape positions and are mounded
- Nahatche soils are nonacid
- Penning soils are in slightly higher landscape positions and have a solum less than 60 inches thick

Typical Profile

Pophers

Surface layer: Upper part—dark grayish brown silty clay loam; lower part—grayish brown silty clay loam with grayish brown masses of iron accumulation
Subsoil layer: Dark grayish brown and grayish brown silty clay loam with yellowish brown, pale brown, gray, and light gray masses of iron accumulation and iron depletions

Koury

Surface layer: Dark grayish brown silt loam

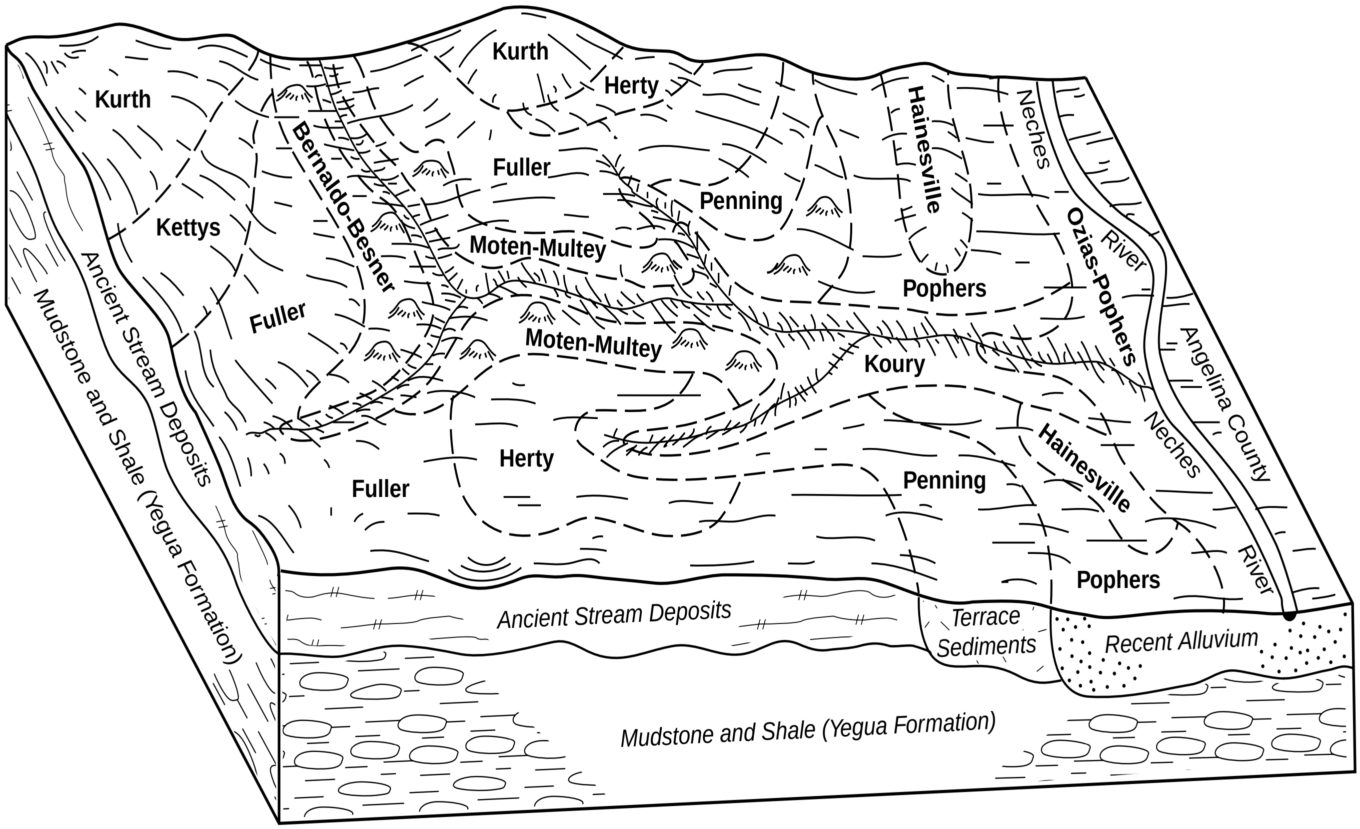


Figure 7.—Typical pattern of soils and parent material on terraces, uplands, and flood plains of the Neches River.

Subsoil layer: Upper part—brown silt loam with yellowish brown and grayish brown masses of iron accumulation and iron depletions; lower part—grayish brown to brown loam and very fine sandy loam with light gray, dark yellowish brown, grayish brown, and light brownish gray masses of iron accumulation and iron depletions

Soil Properties and Qualities

Pophers

Depth class: Very deep
Drainage class: Somewhat poorly drained
Flooding: Frequently flooded
Permeability: Moderately slow
Slope: Nearly level

Koury

Depth class: Very deep
Drainage class: Moderately well drained
Flooding: Frequently flooded
Permeability: Moderately slow
Slope: Nearly level

Land Use

Dominant uses: Woodland

Other uses: Pastureland

Pasture and hayland

Suitability: Pophers—poorly suited; Koury—well suited
Adapted plants: Bahiagrass and common bermudagrass
Management concerns: Fertilizer, lime, and rotational grazing are needed for sustained yields

Woodland

Suitability: Poorly suited
Common trees: Sweetgum, water oak, and willow oak are dominant; loblolly pine grows well in areas of the Koury soil
Management concerns: Flooding and wetness hinder most harvesting operations

11. Texark-Kaufman

Nearly level, moderately well drained and somewhat poorly drained soils that are clayey throughout; on savannas

Setting

Landform: Flood plains
Landform position: Bottomland flats
Distinctive landform features: Flood plain of the Trinity River and formed in clayey fluvial sediments transported from soils upriver that formed in Cretaceous limestone and marl; vertical relief is less than 10 feet per mile
Slope: 0 to 1 percent

Composition

Percent of the survey area: 6 percent
Texark and similar soils—32 percent
Kaufman and similar soils—29 percent
Minor soils—39 percent (includes Derly, Freestone, Hainesville, Kosse, and Portersprings soils)

- Derly and Freestone soils are on mounded terraces
- Hainesville soils are sandy throughout and are on slightly higher ridges
- Kosse and Portersprings soils are loamy throughout, have less wetness, and are in slightly higher landscape positions

Typical Profile

Texark

Surface layer: Very dark gray clay
Subsoil layer: Upper part—dark gray clay with strong brown, dark yellowish brown, and gray masses of iron accumulation and iron depletions; lower part—grayish brown clay with dark grayish brown iron depletions

Kaufman

Surface layer: Very dark gray clay with strong brown iron stains
Subsoil layer: Upper part—very dark gray to dark gray clay; lower part—dark gray and very dark gray clay with strong brown and light olive brown masses of iron accumulation

Soil Properties and Qualities

Texark

Depth class: Very deep
Drainage class: Somewhat poorly drained
Flooding: Occasionally to frequently flooded
Permeability: Very slow
Slope: Nearly level

Kaufman

Depth class: Very deep
Drainage class: Moderately well drained
Flooding: Occasionally to frequently flooded
Permeability: Very slow
Slope: Nearly level

Land Use

Dominant uses: Cropland

Other uses: Pastureland; some areas are used as woodland

Pasture and hayland

Suitability: Texark—not suited or poorly suited; Kaufman—moderately well suited
Adapted plants: Bahiagrass and common bermudagrass
Management concerns: Seasonal wetness due to flooding

Woodland

Suitability: Poorly suited
Common trees: Hardwoods
Management concerns: Flooding and high pH

12. Laneville-Nahatche-Hannahatchee

Nearly level, well drained to somewhat poorly drained, loamy soils that have a loamy or clayey subsoil; in pine-hardwood forest

Setting

Landform: Flood plains
Landform position: Bottomland flats
Distinctive landform features: Vertical relief is less than 5 to 10 feet per mile
Slope: 0 to 1 percent

Composition

Percent of the survey area: 4 percent
Laneville and similar soils—29 percent
Nahatche and similar soils—15 percent
Hannahatchee and similar Iulus soils—14 percent
Minor soils—42 percent (includes Attoyac, Bernaldo, Latex, Naconiche, Rentzel, and Sawlit soils)

- Attoyac and Bernaldo soils are on nearly level to very gently sloping terraces
- Latex and Sawlit soils are on broad, mounded, nearly level terraces
- Naconiche soils are very poorly drained
- Rentzel soils are on the toeslopes of upland soils and are moderately well drained

Typical Profile

Laneville

Surface layer: Dark brown and brown loam with strong brown and yellowish brown masses of iron accumulation
Subsoil layer: Upper part—variegated dark yellowish brown, yellowish brown, and grayish brown loam; middle part—grayish brown clay loam with yellowish brown, yellowish red, and red masses of iron accumulation; lower part—dark gray clay with dark red, yellowish brown, and brown masses of iron accumulation

Nahatche

Surface layer: Upper part—dark grayish brown loam; lower part—variegated dark grayish brown, brown, yellowish brown, and dark brown fine sandy loam
Subsoil layer: Dark grayish brown clay loam to loam with dark yellowish brown, yellowish brown, and brown masses of iron accumulation in the upper part
Buried surface layer: Dark gray clay loam with dark yellowish brown masses of iron accumulation and light gray streaks of clean sand

Hannahatchee

Surface layer: Upper part—dark yellowish brown fine sandy loam; lower part—dark brown loam
Subsoil layer: Upper part—dark yellowish brown to reddish brown sandy clay loam with brown mottles; lower part—variegated strong brown, reddish brown, dark brown, red, and grayish brown loam to sandy clay loam

Soil Properties and Qualities

Laneville

Depth class: Very deep
Drainage class: Moderately well drained
Flooding: Frequently flooded
Permeability: Slow
Slope: Nearly level

Nahatche

Depth class: Very deep
Drainage class: Somewhat poorly drained
Flooding: Frequently flooded
Permeability: Moderate
Slope: Nearly level

Hannahatchee

Depth class: Very deep
Drainage class: Well drained
Flooding: Frequently flooded
Permeability: Moderate
Slope: Nearly level

Land Use

Dominant uses: Pasture and hayland

Other uses: Woodland

Pasture and hayland

Suitability: Laneville and Hannahatchee—very well suited; Nahatche— poorly suited or very poorly suited
Adapted plants: Improved bermudagrass and bahiagrass
Management concerns: Fertilizer, lime, and rotational grazing are needed for sustained yields

Woodland

Suitability: Poorly suited
Common trees: Hardwood trees, such as sweetgum, water oak, and willow oak are dominant; loblolly pine also grows well on Laneville and Hannahatchee soils
Management concerns: Flooding and wetness hinder harvesting operations

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, LaCerda clay loam, 5 to 15 percent slopes, is a phase of the LaCerda series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Freestone-Derly complex, 0 to 2 percent slopes, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the

soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Soil Descriptions

AaB—Alazan very fine sandy loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes and drainageways
Slope: Nearly level to very gently sloping
Shape of areas: Long and narrow
Size of areas: 25 to 50 acres
Native vegetation: Pine-hardwood forest

Composition

Alazan and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Hainesville soils are in slightly higher areas and are sandy throughout
- Mollville soils are gray throughout and are poorly drained

Typical Profile

Surface layer:
0 to 3 inches—strongly acid, dark grayish brown very fine sandy loam with brownish yellow masses of iron accumulation

Subsurface layer:
3 to 9 inches—strongly acid, pale brown very fine sandy loam with yellowish brown masses of iron accumulation

Subsoil:
9 to 25 inches—strongly acid, brownish yellow loam with light brownish gray iron depletions and very pale brown streaks
25 to 36 inches—strongly acid, brownish yellow sandy clay loam with light brownish gray iron depletions and very pale brown streaks
36 to 60 inches—slightly acid, variegated yellowish brown, light yellowish brown, and light brownish gray sandy clay loam with very pale brown streaks
60 to 80 inches—slightly acid, variegated red, dark red, yellowish red, brownish yellow, and light gray sandy clay loam with very pale brown streaks

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Apparent at 1.5 to 3.5 feet during January through April
Hazard of flooding: None
Runoff: Low
Permeability: Moderate
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Low strength may limit road use by heavy equipment
- The use of some types of equipment may be restricted when the water table is high
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Slightly wet conditions during the winter and early spring may interfere with harvesting hay, the grazing rotation, or the use of equipment
- Soil acidity and inadequate fertility limits forage production

Cropland

Major limitations:
- This soil has a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of surface and ground water
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIw
Woodland management group: 7
Pasture management group: 6

AbA—Alazan-Besner complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Mounds
Landform position: Toeslopes; Besner—mounds; Alazan—concave, low areas between mounds
Slope: Nearly level, mostly; but some areas are very gently sloping
Shape of areas: Oblong
Size of areas: 20 to 75 acres
Native vegetation: Pine-hardwood forest

Composition

Alazan and similar soils: 60 percent
Besner and similar soils: 30 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Mollville soils are grayish throughout and are poorly drained

Typical Profile

Alazan

Surface layer:
0 to 6 inches—strongly acid, dark grayish brown very fine sandy loam

Subsurface layer:
6 to 12 inches—strongly acid, brown very fine sandy loam with brownish yellow masses of iron accumulation

Subsoil:
12 to 36 inches—strongly acid, brownish yellow loam with light brownish gray iron depletions and light gray streaks
36 to 45 inches—strongly acid, grayish brown sandy clay loam with brownish yellow masses of iron accumulation
45 to 66 inches—strongly acid, light brownish gray sandy clay loam with yellowish brown and strong brown masses of iron accumulation
66 to 80 inches—strongly acid, light brownish gray sandy clay loam with red and yellowish brown masses of iron accumulation

Besner

Surface layer:
0 to 5 inches—moderately acid, dark brown fine sandy loam

Subsurface layers:
5 to 15 inches—moderately acid, brown fine sandy loam
15 to 28 inches—moderately acid, pale brown fine sandy loam

Subsoil:
28 to 37 inches—strongly acid, variegated yellowish brown and strong brown loam
37 to 43 inches—strongly acid, yellowish brown loam with light brownish gray, brownish yellow, and red masses of iron accumulation and pale brown streaks
43 to 58 inches—strongly acid, variegated yellowish brown and dark red sandy clay loam with very pale brown streaks
58 to 69 inches—strongly acid, grayish brown clay loam with yellowish brown, dark red, and light gray iron accumulations and iron depletions
69 to 83 inches—strongly acid, variegated light yellowish brown, light gray, and strong brown sandy clay loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Alazan—moderately well drained; Besner—well drained
Water table: Alazan—apparent at 1.5 to 3.5 feet during January through April; Besner—apparent at 4 to 6 feet during late winter and early spring
Hazard of flooding: None
Runoff: Low
Permeability: Moderate
Available water capacity: Alazan—high; Besner—moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Alazan—slight; Besner—moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Alazan—low strength may limit road use by heavy equipment
- Alazan—the use of some types of equipment may be restricted when the water table is high
- Alazan—the abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- These soils are well suited to the production of grasses and legumes

Minor limitations:
- Alazan—slightly wet conditions during the winter and early spring may interfere with harvesting hay, the grazing rotation, or the use of equipment
- Alazan and Besner—soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- Alazan—a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of surface and ground water
- Alazan—seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection
- Besner—a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Besner—moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter is maintained, this soil is very productive

Interpretive Groups

Land capability classification: Alazan—IIw; Besner—IIe
Woodland management group: Alazan—7; Besner—10
Pasture management group: Alazan—6; Besner—1

AfB—Alto fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Very gently sloping
Shape of areas: Broad and irregular
Size of areas: 75 to 100 acres
Native vegetation: Pine-hardwood forest

Composition

Alto and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Percilla soils are ponded during much of the wet season and are poorly drained
- Trawick soils are similar, except they are on slopes up to 15 percent

Typical Profile

Surface layer:
0 to 4 inches—moderately acid, brown fine sandy loam

Subsoil:
4 to 16 inches—slightly acid, strong brown sandy clay loam with brownish yellow masses of iron accumulation
16 to 25 inches—slightly acid, strong brown clay loam with brownish yellow and dark red masses of iron accumulation
25 to 32 inches—slightly acid, yellowish brown clay loam with dark red and brownish yellow masses of iron accumulation
32 to 40 inches—slightly acid, yellowish brown clay with brownish yellow and dark red masses of iron accumulation
40 to 48 inches—slightly acid, dark yellowish brown gravelly clay with brownish yellow and dark red masses of iron accumulation
48 to 56 inches—moderately acid, dark yellowish brown very gravelly clay with brownish yellow and dark red masses of iron accumulation

Underlying layers:
56 to 65 inches—neutral, yellowish brown clay, weathered glauconitic materials with a loam to clay texture, and red pockets of silty clay
65 to 80 inches—neutral, variegated strong brown, yellowish brown, and light olive brown stratified weathered glauconitic material with texture of loam

Soil Properties and Qualities

Depth: Deep
Drainage class: Moderately well drained
Water table: Apparent at 2.5 to 4 feet during January through March
Hazard of flooding: None
Runoff: Low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of surface and ground water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter is maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 10
Pasture management group: 9

AnA—Annona loam, 0 to 1 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Nearly level
Shape of areas: Oval and irregular
Size of areas: 50 to 175 acres
Native vegetation: Savannah

Composition

Annona and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Derly soils are poorly drained and are in depressions
- Hainesville soils are sandy throughout and are somewhat excessively drained

Typical Profile

Surface layer:
0 to 8 inches—slightly acid, dark brown loam

Subsoil:
8 to 14 inches—very strongly acid, dark red clay with light yellowish brown mottles
14 to 34 inches—strongly acid, dark red clay with light yellowish brown mottles
34 to 65 inches—strongly acid, dark red clay with gray and pale brown relict iron depletions
65 to 89 inches—moderately acid, red clay with gray relict iron depletions

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland and cropland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted during wet seasons

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: IIIw
Woodland management group: 21
Pasture management group: 9

AnB—Annona loam 1 to 3 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Very gently sloping
Shape of areas: Broad and irregular
Size of areas: 20 to 100 acres
Native vegetation: Savannah

Composition

Annona and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Derly soils are poorly drained and are in depressions
- Hainesville soils are sandy throughout and are somewhat excessively drained

Typical Profile

Surface layer:
0 to 4 inches—slightly acid, dark grayish brown loam

Subsurface layer:
4 to 10 inches—moderately acid, brown loam with strong brown and light brownish gray mottles

Subsoil:
10 to 16 inches—very strongly acid, dark red clay with pale brown relict iron depletions
16 to 27 inches—strongly acid, dark red clay with light brownish gray relict iron depletions
27 to 38 inches—strongly acid, variegated gray, dark reddish brown, and yellowish brown clay
38 to 52 inches—neutral, variegated light brownish gray, brown, and brownish yellow clay
52 to 63 inches—moderately alkaline, brownish yellow clay
63 to 82 inches—moderately alkaline, brownish yellow clay loam with light gray relict iron depletions

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: High
Wind erosion hazard: Slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted during wet seasons

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 21
Pasture management group: 9

AtB—Attoyac fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Very gently sloping
Shape of areas: Oblong
Size of areas: 20 to 100 acres
Native vegetation: Pine-hardwood forest

Composition

Attoyac and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Hainesville soils are in slightly higher areas and are sandy throughout

Typical Profile

Surface layers:
0 to 6 inches—moderately acid, dark brown fine sandy loam
6 to 16 inches—moderately acid, brown fine sandy loam

Subsoil:
16 to 43 inches—moderately acid, yellowish red sandy clay loam with red mottles
43 to 56 inches—strongly acid, yellowish red sandy clay loam with red and brownish yellow mottles
56 to 80 inches—strongly acid, variegated red and brownish yellow sandy clay loam with light brownish gray mottles

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderate
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is very well suited to the production of grasses and legumes

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 6
Pasture management group: 1

AuB—Austonio fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes and terrace remnants
Slope: Very gently sloping
Shape of areas: Oval; larger areas are irregular
Size of areas: 15 to 100 acres
Native vegetation: Pine-hardwood forest

Composition

Austonio and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Derly and Mollville soils are in depressions and are poorly drained
- Hainesville soils are on similar landscapes and are somewhat excessively drained

Typical Profile

Surface layers:
0 to 3 inches—slightly acid, dark brown fine sandy loam
3 to 12 inches—moderately acid, brown fine sandy loam

Subsurface layer:
12 to 19 inches—moderately acid, light yellowish brown fine sandy loam

Subsoil:
19 to 42 inches—slightly acid, yellowish brown sandy clay loam with red masses of iron accumulation
42 to 68 inches—strongly acid, brownish yellow fine sandy loam with light yellowish brown masses of iron accumulation

Underlying layer:
68 to 80 inches—moderately acid, light yellowish brown loamy fine sand with brownish yellow masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Wind erosion hazard: Moderate

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 10
Pasture management group: 1

AuD—Austonio fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Irregular
Size of areas: 15 to 70 acres
Native vegetation: Pine-hardwood forest

Composition

Austonio and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

• Woodtell soils have a clayey subsoil and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 4 inches—slightly acid, dark brown fine sandy loam

Subsurface layer:
4 to 11 inches—slightly acid, brown fine sandy loam

Subsoil:
11 to 25 inches—strongly acid, red sandy clay loam
25 to 52 inches—strongly acid, yellowish red sandy clay loam
52 to 72 inches—strongly acid, strong brown and brownish yellow fine sandy loam

Underlying layer:
72 to 80 inches—very strongly acid, very pale brown loamy fine sand

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: High
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Wind erosion hazard: Moderate

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
• None
Minor limitations:
• Slope may cause a moderate rate of erosion following harvesting or other disturbance

Pasture and hayland

Major limitations:
• This soil is well suited to the production of grasses and legumes
Minor limitations:
• On steeper slopes, water runoff is higher and less water enters the root zone for plant production
• Steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
• This soil has a high potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil
Minor limitations:
• Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: VIe
Woodland management group: 10
Pasture management group: 3

BaB—Bernaldo fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Very gently sloping
Shape of areas: Oblong
Size of areas: 50 to 150 acres
Native vegetation: Pine-hardwood forest

Composition

Bernaldo and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Mollville soils are in depressions and are poorly drained

Typical Profile

Surface layer:
0 to 5 inches—moderately acid, very dark grayish brown fine sandy loam

Subsurface layer:
5 to 15 inches—moderately acid, light yellowish brown fine sandy loam

Subsoil:
15 to 49 inches—very strongly acid to moderately acid, yellowish brown sandy clay loam with dark red masses of iron accumulation
49 to 84 inches—very strongly acid, brownish yellow sandy clay loam with red masses of iron accumulation and light yellowish brown and light gray streaks

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: Perched at 4 to 6 feet during November through February
Hazard of flooding: None
Runoff: Very low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 6
Pasture management group: 1

BbA—Bernaldo-Besner complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Mounds
Landform position: Toeslopes; Besner—mounds; Bernaldo—concave, low areas between mounds
Slope: Nearly level, mostly; but some areas are very gently sloping
Shape of areas: Irregular
Size of areas: 20 to 50 acres
Native vegetation: Pine-hardwood forest

Composition

Bernaldo and similar soils: 50 percent
Besner and similar soils: 40 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Mollville soils are in depressions and are poorly drained

Typical Profile

Bernaldo

Surface layer:
0 to 5 inches—slightly acid, brown fine sandy loam

Subsurface layer:
5 to 18 inches—slightly acid, yellowish brown fine sandy loam

Subsoil:
18 to 35 inches—strongly acid, yellowish brown sandy clay loam with strong brown masses of iron accumulation
35 to 41 inches—strongly acid, variegated yellowish brown and very pale brown sandy clay loam
41 to 58 inches—strongly acid, variegated yellowish brown and light gray loam
58 to 80 inches—strongly acid, variegated yellowish and light brownish gray loam

Besner

Surface layer:
0 to 7 inches—slightly acid, brown fine sandy loam

Subsurface layer:
7 to 27 inches—slightly acid, light yellowish brown fine sandy loam

Subsoil:
27 to 33 inches—slightly acid, strong brown fine sandy loam with pale brown streaks
33 to 44 inches—slightly acid, strong brown loam with pale brown streaks
44 to 61 inches—slightly acid, strong brown loam with very pale brown streaks
61 to 74 inches—slightly acid, strong brown and brownish yellow loam with very pale brown streaks
74 to 80 inches—slightly acid, strong brown fine sandy loam with very pale brown and brownish yellow streaks

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: Bernaldo—perched at 4 to 6 feet during November through February; Besner—apparent at 4 to 6 feet during January and February
Hazard of flooding: None
Runoff: Bernaldo—very low; Besner—negligible
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland and woodland
Other uses: Cropland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- These soils are well suited to the production of grasses and legumes; forage yields are high, and there are no major soil related limitations to management

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- Wind erosion may be a problem if large areas are cultivated

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive
- Some areas of these soils have a moderate potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Interpretive Groups

Land capability classification: IIe
Woodland management group: Bernaldo soil—6; Besner soil—10
Pasture management group: 1

BeA—Besner fine sandy loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Nearly level to very gently sloping
Shape of areas: Oblong
Size of areas: 15 to 60 acres
Native vegetation: Pine-hardwood forest

Composition

Besner and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Mollville soils are in depressions and are poorly drained

Typical Profile

Surface layer:
0 to 10 inches—moderately acid, brown fine sandy loam

Subsurface layer:
10 to 18 inches—moderately acid, light yellowish brown fine sandy loam

Subsoil:
18 to 30 inches—strongly acid, strong brown fine sandy loam
30 to 49 inches—strongly acid to slightly acid, strong brown to reddish yellow loam with yellowish red masses of iron accumulation and very pale brown streaks
49 to 65 inches—slightly acid, strong brown loam with very pale brown streaks
65 to 80 inches—slightly acid, yellowish brown fine sandy loam with pale brown streaks

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: Apparent at 4 to 6 feet during January and February
Hazard of flooding: None
Runoff: Negligible
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland and woodland
Other uses: Cropland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 10
Pasture management group: 1

BtC—Betis loamy fine sand, 1 to 5 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Gently sloping
Shape of areas: Broad and irregular
Size of areas: 100 to 300 acres
Native vegetation: Pine-hardwood forest

Composition

Betis and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Bowie soils are loamy throughout and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 10 inches—strongly acid, dark yellowish brown loamy fine sand

Subsurface layer:
10 to 40 inches—moderately acid, yellowish brown loamy fine sand

Subsoil:
40 to 49 inches—moderately acid, yellowish brown loamy fine sand with pockets of very pale brown fine sand
49 to 61 inches—moderately acid, very pale brown loamy fine sand with thin bands of light brown fine sandy loam
61 to 83 inches—moderately acid, very pale brown loamy fine sand with thin bands of strong brown fine sandy loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat excessively drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very low
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Cropland and pastureland
Other uses: Woodland

Woodland

Major limitations:
- The droughty nature of this soil may cause a high rate of seedling mortality
- The loose, sandy surface may severely restrict equipment use during dry periods

Minor limitations:
- The low available water capacity causes competition for moisture between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- High amounts of organic matter are needed on this soil to help hold adequate amounts of moisture in the root zone and to reduce leaching of plant nutrients

Minor limitations:
- This soil has a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: IIIs
Woodland management group: 17
Pasture management group: 12

BwB—Bowie fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Footslopes or toeslopes
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 15 to 35 acres
Native vegetation: Pine-hardwood forest

Composition

Bowie and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Betis, Darco, and Grapeland soils are sandy to depths more than 40 inches
- Lilbert soils are sandy to depths of 20 to 40 inches

Typical Profile

Surface layer:
0 to 6 inches—moderately acid, brown fine sandy loam

Subsurface layer:
6 to 13 inches—moderately acid, very pale brown fine sandy loam

Subsoil:
13 to 29 inches—strongly acid, yellowish brown sandy clay loam with yellowish red masses of iron accumulation

29 to 38 inches—strongly acid, brownish yellow sandy clay loam with red and strong brown masses of iron accumulation
38 to 52 inches—strongly acid, yellowish brown sandy clay loam with red masses of iron accumulation and light brownish gray iron depletions
52 to 72 inches—very strongly acid, brownish yellow sandy clay loam with red and yellowish red masses of iron accumulation and light gray iron depletions
72 to 93 inches—strongly acid, variegated dark reddish brown, brownish yellow, and light gray sandy clay loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: Perched at 3.5 to 6 feet during January through April
Hazard of flooding: None
Runoff: Low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland and woodland
Other uses: Cropland

Woodland

Major limitations:
• None
Minor limitations:
• None

Pasture and hayland

Major limitations:
• This soil is well suited to the production of grasses and legumes
Minor limitations:
• The moderate capacity to store water slightly lowers the potential forage production
• Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
• This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water
Minor limitations:
• Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 10
Pasture management group: 5

ChA—Chireno loam, 0 to 1 percent slopes

Setting

Landform: Terraces
Distinctive landform features: None
Landform position: Slightly concave areas on toeslopes
Slope: Nearly level
Shape of areas: Oblong
Size of areas: 5 to 20 acres
Native vegetation: Savannah

Composition

Chireno and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

• Percilla soils are poorly drained and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 12 inches—slightly acid, very dark gray loam

Subsoil layers:
12 to 20 inches—neutral, very dark gray loam with dark yellowish brown masses of iron accumulation
20 to 25 inches—neutral, very dark grayish brown clay with dark yellowish brown masses of iron accumulation and very dark gray spots
25 to 41 inches—neutral, variegated very dark gray, yellowish brown, and dark yellowish brown clay loam

41 to 60 inches—neutral, dark yellowish brown, very dark gray, and reddish brown clay loam
60 to 80 inches—neutral, dark yellowish brown clay loam with olive brown masses

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Apparent at 3.5 to 5 feet during January through April
Hazard of flooding: None
Runoff: Very low
Permeability: Moderately slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high
- Low strength may limit road use by heavy equipment

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes; forage yields are high, and there are no major soil related limitations to management

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching and a slight potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of the surface and ground water

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIs
Woodland management group: 25
Pasture management group: 2

CtE—Cuthbert fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 25 to 150 acres
Native vegetation: Pine-hardwood forest

Composition

Cuthbert and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Tenaha soils have a sandy surface more than 20 inches thick

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, very dark grayish brown fine sandy loam

Subsurface layer:
4 to 9 inches—strongly acid, yellowish brown fine sandy loam

Subsoil:
9 to 16 inches—very strongly acid, red clay
16 to 23 inches—very strongly acid, red clay with strong brown mottles and light gray shale fragments

23 to 28 inches—very strongly acid, red clay with strong brown mottles and light gray shale fragments
28 to 35 inches—very strongly acid, red clay with strong brown sandstone and light gray shale

Underlying layers:
35 to 48 inches—extremely acid, stratified light gray shale with texture of clay loam and red and strong brown soft sandstone with texture of fine sandy loam to sandy clay loam
48 to 62 inches—extremely acid, stratified red and strong brown sandstone with texture of sandy clay loam and light gray shale with texture of clay loam

Soil Properties and Qualities

Depth: Moderately deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Slope may cause a moderate rate of erosion following harvesting or other disturbance
- Slope may restrict the use of some types of equipment during management operations
- Low strength may limit road use by heavy equipment

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited by the clayey subsoil, which limits water intake and storage for plant production
- On steeper slopes, water runoff is higher and less water enters the root zone for plant production
- Steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIe
Woodland management group: 20
Pasture management group: 13

CtG—Cuthbert fine sandy loam, 15 to 35 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately steep to steep
Shape of areas: Long and narrow
Size of areas: 25 to 150 acres
Native vegetation: Pine-hardwood forest

Composition

Cuthbert and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Tenaha soils are sandy to depths more than 20 inches

Typical Profile

Surface layer:
0 to 4 inches—moderately acid, very dark grayish brown fine sandy loam

Subsurface layer:
4 to 9 inches—moderately acid, pale brown fine sandy loam

Subsoil:
9 to 16 inches—very strongly acid, red clay
16 to 28 inches—very strongly acid, yellowish red sandy clay with very pale brown fragments of shale

Underlying layer:
28 to 60 inches—very strongly acid, light gray, yellow, and yellowish red alternate layers of sandstone and shale

Soil Properties and Qualities

Depth: Moderately deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: High
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Steepness of slope may cause a rapid rate of erosion following harvesting or other disturbance
- Steepness of slope may cause severe road-surface or road-ditch erosion
- Steepness of slope severely restricts the use of equipment during management operations

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is poorly suited to the production of grasses and legumes

Minor limitations:
- None

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIIe
Woodland management group: 22
Pasture management group: 19

CuE—Cuthbert gravelly fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 20 to 100 acres
Native vegetation: Pine-hardwood forest

Composition

Cuthbert and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Soils that are otherwise similar are on much steeper slopes and either have boulders covering the surface or no longer have a topsoil layer due to erosion

Typical Profile

Surface layer:
0 to 5 inches—slightly acid, dark brown gravelly fine sandy loam

Subsoil:
5 to 22 inches—strongly acid, red clay with shale fragments
22 to 35 inches—very strongly acid, red clay with fragments of gray unweathered shale

Underlying layer:
35 to 60 inches—very strongly acid, stratified red and brownish yellow sandstone with thin layers of light gray shale

Soil Properties and Qualities

Depth: Moderately deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- This soil is well suited to the production of grasses and legumes; forage yields are high and there are no major soil related limitations to management

Minor limitations:
- Slope may cause a moderate rate of erosion following harvesting or other disturbance
- Low strength may limit road use by heavy equipment
- Slope may restrict the use of some types of equipment during management operations

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- On steeper slopes, water runoff is greater and less water enters the root zone for plant production
- Steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIe
Woodland management group: 20
Pasture management group: 13

DaC—Darco loamy fine sand, 1 to 8 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Very gently sloping to moderately sloping
Shape of areas: Round to oblong
Size of areas: 10 to 200 acres
Native vegetation: Pine-hardwood forest

Composition

Darco and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Sacul soils have a loamy surface less than 18 inches thick and a clayey subsoil

Typical Profile

Surface layer:
0 to 12 inches—moderately acid, brown loamy fine sand

Subsurface layers:
12 to 26 inches—moderately acid, light yellowish brown loamy fine sand
26 to 47 inches—moderately acid, pale brown loamy fine sand with light yellowish brown iron stains

Subsoil:
47 to 54 inches—strongly acid, strong brown sandy clay loam with dark red masses of iron accumulation
54 to 68 inches—strongly acid, variegated red, strong brown, and light brownish gray sandy clay loam
68 to 82 inches—strongly acid, variegated red, strong brown, and light gray sandy clay loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat excessively drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very low
Permeability: Surface and subsurface—rapid; subsoil—moderate
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland and cropland (fig. 8)
Other uses: Woodland

Woodland

Major limitations:
- The loose, sandy surface may severely restrict equipment use during dry periods

Minor limitations:
- The low available water capacity of this soil may cause moderate seedling mortality

Figure 8.—This area of Darco loamy fine sand, 1 to 8 percent slopes, is excellent for growing crops, such as watermelons and peanuts.

- The low available water capacity causes competition for moisture between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited by the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- High amounts of organic matter are needed on this soil to help hold adequate amounts of moisture in the root zone and to reduce leaching of plant nutrients

Minor limitations:
- This soil has a moderate potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: IVe
Woodland management group: 17
Pasture management group: 12

DaE—Darco loamy fine sand, 8 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Strongly sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 12 to 50 acres
Native vegetation: Pine-hardwood forest

Composition

Darco and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Cuthbert soils have a loamy surface less than 20 inches thick and a clayey subsoil

Typical Profile

Surface layers:
0 to 6 inches—slightly acid, dark brown loamy fine sand
6 to 12 inches—slightly acid, brown loamy fine sand

Subsurface layers:
12 to 44 inches—slightly acid, brown loamy fine sand
44 to 49 inches—slightly acid, light yellowish brown loamy fine sand

Subsoil:
49 to 54 inches—very strongly acid, yellowish brown sandy clay loam with yellowish red and light gray mottles
54 to 58 inches—very strongly acid, brownish yellow sandy clay loam with yellowish brown, red, and light brownish gray mottles
58 to 66 inches—very strongly acid, variegated brownish yellow, light gray, and dark reddish brown sandy clay loam
66 to 80 inches—very strongly acid, light gray clay loam with dark reddish brown mottles

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat excessively drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Surface and subsurface—rapid; subsoil—moderate
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- The loose, sandy surface and steep slopes severely restrict the use of equipment during management operations

Minor limitations:
- The low available water capacity of this soil may cause moderate seedling mortality
- Slope may cause a moderate rate of erosion following harvesting or other disturbance
- The low available water capacity causes competition for moisture between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited by the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Production is less on slopes above 10 percent; equipment use is impaired due to the loose, sandy surface

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIe
Woodland management group: 17
Pasture management group: 16

EaA—Eastham clay, 0 to 1 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Gilgai
Landform position: Toeslopes
Slope: Nearly level
Shape of areas: Oblong to elongated
Size of areas: 25 to 150 acres
Native vegetation: Savannah

Composition

Eastham and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Hainesville soils are sandy throughout and are in slightly higher landscape positions
- Austonio and Freestone soils are loamy throughout and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 6 inches—slightly acid, very dark gray clay

Subsoil:
6 to 10 inches—slightly acid, very dark gray clay
10 to 17 inches—moderately acid, dark gray clay with light olive brown relict masses of iron accumulation
17 to 28 inches—moderately acid, gray clay with light olive brown relict masses of iron accumulation
28 to 33 inches—slightly alkaline, grayish brown clay with light olive brown relict masses of iron accumulation
33 to 56 inches—slightly alkaline, gray clay with light olive brown relict masses of iron accumulation and gypsum crystals
56 to 66 inches—slightly alkaline, gray clay with light olive brown relict masses of iron accumulation and calcium carbonate concretions
66 to 80 inches—slightly alkaline, gray clay with yellowish brown relict masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Cropland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Low soil strength may limit equipment use when this soil is wet

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil has a low potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIw
Woodland management group: 28
Pasture management group: 7

EaB—Eastham clay, 1 to 3 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Gilgai
Landform position: Toeslopes
Slope: Very gently sloping
Shape of areas: Oval to elongated
Size of areas: 25 to 150 acres
Native vegetation: Savannah

Composition

Eastham and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Austonio and Freestone soils are loamy throughout and are in slightly higher landscape positions
- Hainesville soils are sandy throughout and are in slightly higher landscape positions

Typical Profile

Surface layers:
0 to 4 inches—moderately acid, very dark gray clay
4 to 17 inches—moderately acid, very dark gray clay with grayish brown relict masses of iron accumulation

Subsoil:
17 to 27 inches—strongly acid, black clay with brown relict masses of iron accumulation
27 to 40 inches—neutral, black clay
40 to 46 inches—slightly alkaline, dark gray clay with light olive brown relict masses of iron accumulation
46 to 57 inches—slightly alkaline, dark grayish brown clay with olive yellow and grayish brown relict masses of iron accumulation
57 to 70 inches—slightly alkaline, gray silty clay with yellowish brown and dark yellowish brown relict masses of iron accumulation
70 to 88 inches—slightly alkaline, light brownish gray silty clay with brownish yellow and dark yellowish brown relict masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Cropland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Low soil strength may limit equipment use when this soil is wet

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIe
Woodland management group: 28
Pasture management group: 7

ErB—Elrose fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Toeslopes
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 25 to 90 acres
Native vegetation: Pine-hardwood forest

Composition

Elrose and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Trawick soils are in slightly higher landscape positions and are on slopes more than 5 percent

Typical Profile

Surface layer:
0 to 5 inches—extremely acid, dark brown fine sandy loam

Subsurface layer:
5 to 12 inches—very strongly acid, brown fine sandy loam

Subsoil:
12 to 20 inches—moderately acid, dark red sandy clay loam with yellowish red masses of iron accumulation
20 to 42 inches—strongly acid, dark red clay
42 to 64 inches—strongly acid, dark red clay
64 to 80 inches—moderately acid, dark red sandy clay with yellowish brown masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter is maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 10
Pasture management group: 1

EtB—Etoile loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Very gently sloping
Shape of areas: Broad and oval
Size of areas: 20 to 150 acres
Native vegetation: Hardwood-pine forest

Composition

Etoile and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Fuller and Penning soils are loamy throughout and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 4 inches—slightly acid, dark brown loam

Subsoil:
4 to 9 inches—strongly acid, yellowish red clay with yellowish red relict masses of iron accumulation
9 to 18 inches—slightly acid, yellowish brown clay with yellowish red relict masses of iron accumulation
18 to 47 inches—slightly acid to slightly alkaline, dark grayish brown to light brownish gray clay with brownish yellow relict masses of iron accumulation

Underlying layer:
47 to 60 inches—neutral, layered light brownish gray, brown, and brownish yellow shale with a texture of clay

Soil Properties and Qualities

Depth: Deep
Drainage class: Moderately well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Cropland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted during wet seasons

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 25
Pasture management group: 9

FrB—Freestone fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 20 to 80 acres
Native vegetation: Pine-hardwood forest

Composition

Freestone and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Derly and Mollville soils are poorly drained and are in depressions

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, dark brown fine sandy loam

Subsurface layer:
4 to 11 inches—very strongly acid, pale brown fine sandy loam

Subsoil:
11 to 23 inches—very strongly acid, brownish yellow sandy clay loam
23 to 35 inches—very strongly acid, brownish yellow sandy clay loam with dark red masses of iron accumulation, gray iron depletions, and pale brown streaks
35 to 40 inches—very strongly acid, variegated brownish yellow, light brownish gray, and dark red sandy clay loam with light gray streaks
40 to 52 inches— very strongly acid, variegated strong brown, red, and light brownish gray clay loam with light gray streaks
52 to 81 inches— very strongly acid, variegated yellowish red, dark reddish brown, red, and light brownish gray clay loam with light gray streaks

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Perched at 2 to 3.5 feet during December through May
Hazard of flooding: None
Runoff: Very low
Permeability: Slow

Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high or flooding occurs
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is very well suited to the production of grasses and legumes

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of the surface and ground water
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIe
Woodland management group: 12
Pasture management group: 1

FsA—Freestone-Derly complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Mounded
Landform position: Toeslopes; Freestone—mounds; Derly—concave, low areas between mounds
Slope: Nearly level to very gently sloping
Shape of areas: Oblong
Size of areas: 35 to 75 acres
Native vegetation: Pine-hardwood forest

Composition

Freestone and similar soils: 50 percent
Derly and similar soils: 35 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Hainesville soils are sandy throughout and are in slightly higher landscape positions

Typical Profile

Freestone

Surface layers:
0 to 3 inches—moderately acid, dark brown fine sandy loam
3 to 9 inches—moderately acid, brown fine sandy loam

Subsurface layer:
9 to 21 inches—slightly acid, brownish yellow fine sandy loam

Subsoil:
21 to 24 inches—strongly acid, brownish yellow sandy clay loam with yellowish red masses of iron accumulation and light brownish gray streaks
24 to 32 inches—strongly acid, yellowish brown sandy clay loam with yellowish red masses of iron accumulation and light brownish gray streaks
32 to 45 inches—very strongly acid, brownish yellow clay loam with red masses of iron accumulation and light brownish gray streaks
45 to 85 inches—very strongly acid, variegated light gray, red, and light yellowish brown clay loam

Derly

Surface layer:
0 to 4 inches—moderately acid, dark grayish brown loam

Subsurface layer:
4 to 12 inches—very strongly acid, light brownish gray loam with brownish yellow masses of iron accumulation

Subsoil:
12 to 23 inches—very strongly acid, dark gray clay loam with light brownish gray streaks

23 to 40 inches—very strongly acid, dark gray clay with light olive brown masses of iron accumulation and light brownish gray streaks
40 to 64 inches—moderately acid, dark gray clay with brownish yellow masses of iron accumulation and light brownish gray streaks
64 to 80 inches—slightly acid, variegated light gray, dark gray, and brownish yellow clay loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Freestone—moderately well drained; Derly—poorly drained
Water table: Freestone—perched at 2 to 3.5 feet during December through May; Derly—perched at +.5 to 1 foot during October through May
Hazard of flooding: None
Runoff: Freestone—very low; Derly—negligible
Permeability: Freestone—slow; Derly—very slow
Available water capacity: Freestone—moderate; Derly—high
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Freestone—moderate to high; Derly—very high
Water erosion hazard: Freestone—moderate; Derly—slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland and cropland

Woodland

Major limitations:
- Derly—wetness from flooding, ponding, or a high water table severely restricts the use of equipment
- Derly—abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- Freestone—the use of some types of equipment may be restricted when the water table is high or flooding occurs
- Freestone—the abundance of moisture may cause competition for sunlight between seedlings and other plants
- Derly—poor drainage may cause moderate pine seedling mortality

Pasture and hayland

Major limitations:
- These soils are moderately suited or poorly suited to the production of grasses and legumes

Minor limitations:
- Freestone—soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer
- Derly—extreme wetness, water ponding on the surface, and poor internal drainage limit production
- Derly—extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Freestone—this soil has a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of the surface and ground water
- Freestone and Derly—seasonal wetness may delay crop planting; due to the wetness problem, crop selection should be given careful consideration

Minor limitations:
- Derly—this soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: Freestone—IIe; Derly—IIIw
Woodland management group: Freestone—12; Derly—24
Pasture management group: Freestone—1; Derly—15

FuA—Fuller fine sandy loam, 0 to 1 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Toeslopes and footslopes
Slope: Nearly level
Shape of areas: Irregular
Size of areas: 20 to 100 acres
Native vegetation: Pine forest

Composition

Fuller and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Etoile and Herty soils have a clayey subsoil and are in similar or slightly higher landscape positions

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, dark grayish brown fine sandy loam

Subsurface layers:
4 to 13 inches—strongly acid, grayish brown fine sandy loam
13 to 26 inches—strongly acid, grayish brown fine sandy loam with dark grayish brown organic stains

Subsoil:
26 to 36 inches—strongly acid, dark grayish brown loam with yellowish brown masses of iron accumulation and light gray streaks
36 to 44 inches—strongly acid, dark gray clay loam with yellowish brown masses of iron accumulation and light gray streaks

Underlying layer:
44 to 66 inches—very strongly acid, light brownish gray sandstone with olive yellow masses of iron accumulation

Soil Properties and Qualities

Depth: Deep
Drainage class: Somewhat poorly drained
Water table: Perched at 0.5 foot to 1.5 feet during January through May
Hazard of flooding: None
Runoff: Low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- The reduced availability of moisture during dry periods may cause a high rate of seedling mortality

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high
- Low strength may limit road use by heavy equipment
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Wetness, poor internal drainage, and presence of salts limit production
- Wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a moderate potential for loss of fertilizer and chemicals by leaching; the selection of chemicals with a low potential for leaching and the correct application of fertilizer elements will help to reduce the risk of ground-water contamination

Interpretive Groups

Land capability classification: IIIw
Woodland management group: 19
Pasture management group: 14

FuB—Fuller fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Toeslopes and footslopes
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 50 to 100 acres
Native vegetation: Pine forest

Composition

Fuller and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Etoile and Herty soils have a clayey subsoil and are in similar or slightly higher landscape positions

Typical Profile

Surface layer:
0 to 7 inches—very strongly acid, grayish brown fine sandy loam

Subsurface layers:
7 to 12 inches—very strongly acid, light brownish gray fine sandy loam with brownish yellow masses of iron accumulation
12 to 27 inches—very strongly acid, light brownish gray fine sandy loam and grayish brown loam with brownish yellow masses of iron accumulation

Subsoil:
27 to 45 inches—slightly acid, grayish brown loam with very pale brown streaks and yellowish brown masses of iron accumulation
45 to 51 inches—neutral, grayish brown clay loam with very pale brown streaks and brownish yellow masses of iron accumulation

Underlying layer:
51 to 65 inches—neutral, light brownish gray mudstone with texture of clay loam

Soil Properties and Qualities

Depth: Deep
Drainage class: Somewhat poorly drained
Water table: Perched at 0.5 foot to 1.5 feet during January through May
Hazard of flooding: None
Runoff: Low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high
- Road-ditch erosion may be a problem due to slope
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes (fig. 9)

Minor limitations:
- Wetness, poor internal drainage, and presence of salts limit production
- Wetness interferes with establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a moderate potential for loss of fertilizer and chemicals by leaching; selection of chemicals with a low potential for leaching and correct application of fertilizer elements will help to reduce the risk of ground-water contamination

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 19
Pasture management group: 14

GaA—Garner clay, 0 to 1 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Gilgai
Landform position: Toeslopes
Slope: Nearly level
Shape of areas: Broad and irregular
Size of areas: 25 to 150 acres
Native vegetation: Savannah

Composition

Garner and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Austonio and Freestone soils are loamy throughout and are in slightly higher landscape positions
- Hainesville soils are sandy throughout and are in slightly higher landscape positions

Figure 9.—In this area of Fuller fine sandy loam, 1 to 3 percent slopes, oats and ryegrass are overseeded in improved pastures to improve the quality of forage.

Typical Profile

Surface layer:
0 to 7 inches—moderately acid, very dark gray clay

Subsoil:
7 to 10 inches—moderately acid, dark gray clay with yellowish brown relict iron accumulations and very dark gray organic stains
10 to 22 inches—moderately acid, dark gray clay with yellowish brown and gray relict iron accumulations and iron depletions
22 to 28 inches—moderately acid, gray clay with strong brown and dark gray relict iron accumulations and iron depletions
28 to 45 inches—slightly acid, dark grayish brown clay with gray and light olive brown masses of iron accumulation
45 to 80 inches—slightly alkaline, gray clay with grayish brown, strong brown, and brownish yellow masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Very slow

Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland
Other uses: Cropland

Woodland

Major limitations:
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- Low soil strength may limit equipment use when this soil is wet
- Poor drainage may cause moderate pine seedling mortality

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIw
Woodland management group: 26
Pasture management group: 7

GrB—Grapeland fine sand, 1 to 4 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Gently sloping
Shape of areas: Oval
Size of areas: 25 to 100 acres
Native vegetation: Pine-hardwood forest

Composition

Grapeland and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Bowie soils are loamy throughout and are in slightly higher landscape positions
- Naconiche soils are very poorly drained and are in depressions

Typical Profile

Surface layers:
0 to 3 inches—strongly acid, dark yellowish brown fine sand
3 to 12 inches—strongly acid, yellowish brown loamy fine sand

Subsoil:
12 to 39 inches—extremely acid, yellowish red loamy fine sand with pockets of pale brown uncoated sand grains
39 to 52 inches—very strongly acid, yellowish red loamy fine sand with pockets of very pale brown uncoated sand grains
52 to 80 inches—very strongly acid, yellowish red loamy fine sand with thin reddish bands

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat excessively drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very low
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Shrink-swell potential: Low
Wind erosion hazard: Severe

Land Use

Dominant uses: Pastureland
Other uses: Cropland

Woodland

Major limitations:
- None

Minor limitations:
- The low available water capacity of this soil may cause moderate seedling mortality
- The sandy surface may interfere with equipment use during dry periods

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- High amounts of organic matter are needed on this soil to help hold adequate amounts of moisture in the root zone and to reduce leaching of plant nutrients

Minor limitations:
- This soil has a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: IIIs
Woodland management group: 17
Pasture management group: 12

HaA—Hainesville fine sand, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Nearly level to very gently sloping
Shape of areas: Irregular and narrow
Size of areas: 30 to 50 acres
Native vegetation: Pine-hardwood forest

Composition

Hainesville and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Austonio and Freestone soils are loamy throughout and are in slightly higher landscape positions
- Annona soils have a clayey subsoil and are in slightly lower landscape positions

Typical Profile

Surface layers:
0 to 5 inches—strongly acid, yellowish brown fine sand
5 to 14 inches—strongly acid, yellowish brown fine sand with black iron stains

Subsoil:
14 to 45 inches—extremely acid or very strongly acid, strong brown loamy fine sand with pockets of very pale brown uncoated sand grains
45 to 70 inches—extremely acid, yellowish brown and brownish yellow loamy fine sand with pockets of very pale brown uncoated sand grains
70 to 80 inches—strongly acid, yellow loamy fine sand with yellowish red masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat excessively drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Negligible
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland and cropland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- The sandy surface may interfere with equipment use during dry periods
- The low available water capacity of this soil may cause moderate seedling mortality

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- High amounts of organic matter are needed on this soil to help hold adequate amounts of moisture in the root zone and to reduce leaching of plant nutrients

Minor limitations:
- This soil has a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: IIIs
Woodland management group: 8
Pasture management group: 10

HbC—Hallsbluff clay loam, 2 to 5 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Gilgai
Landform position: Footslopes
Slope: Gently sloping
Shape of areas: Long and narrow
Size of areas: 10 to 50 acres
Native vegetation: Savannah

Composition

Hallsbluff and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Naclina soils are on slopes more than 15 percent
- Tenaha soils have a sandy surface at least 20 inches thick and are on steeper slopes in slightly higher landscape positions

Typical Profile

Surface layers:
0 to 6 inches—slightly alkaline, very dark grayish brown clay loam
6 to 17 inches—slightly alkaline, very dark grayish brown silty clay

Subsoil:
17 to 29 inches—slightly alkaline, very dark grayish brown silty clay with light olive brown relict masses of iron accumulation
29 to 52 inches—moderately alkaline, olive and light olive brown clay with dark grayish brown relict masses of iron accumulation and very dark gray relict iron depletions
52 to 80 inches—moderately alkaline, yellowish brown clay with light brownish gray relict iron depletions

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: High
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: Very high
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland
Other uses: Woodland and cropland

Woodland

Major limitations:
- The reduced availability of moisture during dry periods, difficulty in achieving proper rooting depth, and soil compaction during tree planting may cause a high rate of seedling mortality

Minor limitations:
- Low soil strength may limit equipment use when this soil is wet

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil has a high potential for loss of fertilizers, insecticides, and herbicides by erosion of the topsoil and leaching that could possibly contaminate surface and/or ground water; good erosion control and proper application of chemicals and fertilizers are essential in proper management of this soil
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 28
Pasture management group: 7

Hc—Hannahatchee fine sandy loam, frequently flooded

Setting

Landform: Flood plain
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Long and narrow
Size of areas: 75 to 100 acres
Native vegetation: Pine-hardwood forest

Composition

Hannahatchee and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Nahatche soils have poor drainage and are in depressions

Typical Profile

Surface layers:
0 to 11 inches—slightly acid, dark yellowish brown fine sandy loam
11 to 23 inches—slightly acid, dark brown loam

Subsoil:
23 to 30 inches—neutral, dark yellowish brown sandy clay loam
30 to 39 inches—neutral, reddish brown sandy clay loam with brown mottles
39 to 63 inches—slightly acid, variegated reddish brown, dark brown, and strong brown loam
63 to 76 inches—strongly acid, variegated red, grayish brown, and strong brown sandy clay loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: Frequent; brief duration
Runoff: Negligible
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is very well suited to the production of grasses and legumes

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures and organic matter are applied, this soil is very productive

Interpretive Groups

Land capability classification: Vw
Woodland management group: 2
Pasture management group: 4

HeA—Herty loam, 0 to 1 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Toeslopes
Slope: Nearly level
Shape of areas: Oblong
Size of areas: 45 to 50 acres
Native vegetation: Pine forest

Composition

Herty and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Fuller and Penning soils are loamy throughout and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 5 inches—strongly acid, brown loam

Subsurface layer:
5 to 8 inches—strongly acid, pale brown loam

Subsoil:
8 to 13 inches—strongly acid, dark grayish brown clay
13 to 18 inches—very strongly acid, grayish brown clay
18 to 28 inches—very strongly acid, dark grayish brown clay
28 to 39 inches—very strongly acid, dark brown clay
39 to 47 inches—very strongly acid, dark grayish brown clay with light yellowish brown masses of iron accumulation

Underlying layers:
47 to 61 inches—very strongly acid, very pale brown mudstone with very dark grayish brown mottles
61 to 80 inches—very strongly acid, light yellowish brown mudstone with yellowish brown mottles

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: Perched at 0 to 1 foot during January through April
Hazard of flooding: None
Runoff: Low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Poor drainage may cause moderate pine seedling mortality
- Low strength may limit road use by heavy equipment
- Low soil strength may limit equipment use when this soil is wet
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIw
Woodland management group: 21
Pasture management group: 9

HeB—Herty loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 10 to 50 acres
Native vegetation: Pine forest

Composition

Herty and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Fuller and Penning soils are loamy throughout and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 3 inches—moderately acid, dark grayish brown loam

Subsurface layer:
3 to 10 inches—moderately acid, brown silt loam

Subsoil:
10 to 24 inches—strongly acid, very dark grayish brown clay
24 to 42 inches—strongly acid, dark grayish brown clay
42 to 45 inches—very strongly acid, dark grayish brown silty clay

Underlying layer:
45 to 80 inches—very strongly acid, olive mudstone with texture of clay loam

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: Perched at 0 to 1 foot during January through April
Hazard of flooding: None
Runoff: Medium
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The abundance of moisture may cause competition for sunlight between seedlings and other plants
- Low soil strength may limit equipment use when this soil is wet
- Poor drainage may cause moderate pine seedling mortality

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed to control erosion

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 21
Pasture management group: 9

Iu—Iulus fine sandy loam, frequently flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Long and narrow
Size of areas: 50 to 125 acres
Native vegetation: Pine-hardwood forest

Composition

Iulus and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Ozias and Pophers soils have poor drainage and are in slightly lower areas
- Nahatche soils are somewhat poorly drained and are in slightly lower landscape positions with higher pH

Typical Profile

Surface layer:
0 to 7 inches—strongly acid, dark yellowish brown fine sandy loam

Subsoil:
7 to 14 inches—strongly acid, yellowish brown fine sandy loam
14 to 22 inches—strongly acid, brown loam with light brownish gray iron depletions and yellowish red masses of iron accumulation
22 to 27 inches—strongly acid, dark grayish brown loam with light brownish gray iron depletions and yellowish red masses of iron accumulation
27 to 40 inches—strongly acid, variegated yellowish brown, dark grayish brown, and light brownish gray fine sandy loam
40 to 70 inches—very strongly acid, brown fine sandy loam to loam with brown and yellowish brown masses of iron accumulation and light gray strata of loamy fine sand
70 to 82 inches—very strongly acid, variegated dark grayish brown, yellowish brown, and grayish brown sandy clay loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Perched at 1.5 to 4 feet during December through April
Hazard of flooding: Frequent; brief duration
Runoff: Very low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high or flooding occurs
- Low strength may limit road use by heavy equipment

Pasture and hayland

Major limitations:
- This soil is very well suited to the production of grasses and legumes

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness due to flooding may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a moderate potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: Vw
Woodland management group: 5
Pasture management group: 4

Ka—Kaufman clay, occasionally flooded

Setting

Landform: Flood plains
Distinctive landform features: Gilgai
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Broad and irregular
Size of areas: 50 to 400 acres
Native vegetation: Savannah

Composition

Kaufman and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Hainesville soils are sandy throughout and are in slightly higher landscape positions
- Portersprings and Kosse soils are loamy throughout and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 14 inches—moderately acid, very dark gray clay

Subsoil:
14 to 45 inches—slightly acid, dark gray clay with light olive brown masses of iron accumulation
45 to 62 inches—neutral, gray clay with light olive brown masses of iron accumulation
62 to 90 inches—moderately alkaline, grayish brown and gray clay with light olive brown masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Apparent at 1.5 to 3.5 feet during November through April
Hazard of flooding: Occasional; brief duration
Runoff: Low
Permeability: Very slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: Very high
Water erosion hazard: Slight

Land Use

Dominant uses: Cropland
Other uses: Pastureland

Woodland

Major limitations:
- The reduced availability of moisture during dry periods, difficulty in achieving proper rooting depth, and soil compaction during tree planting may cause a high rate of seedling mortality
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- The use of some types of equipment may be restricted during wet seasons or when flooding occurs

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness due to flooding may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: IIw
Woodland management group: 27
Pasture management group: 8

Kb—Kaufman clay, frequently flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Broad and irregular
Size of areas: 30 to 100 acres
Native vegetation: Savannah

Composition

Kaufman and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Hainesville soils are sandy throughout and are in slightly higher landscape positions
- Kosse and Portersprings soils are loamy throughout and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 7 inches—moderately acid, very dark gray clay with strong brown root stains

Subsoil:
7 to 24 inches—moderately acid, very dark gray clay
24 to 41 inches—moderately acid, dark gray clay
41 to 62 inches—slightly acid, dark gray clay with strong brown masses of iron accumulation
62 to 80 inches—neutral, very dark gray clay with strong brown and light olive brown masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Apparent at 1.5 to 3.5 feet during November through April
Hazard of flooding: Frequent; very brief to brief duration
Runoff: Low
Permeability: Very slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: Very high
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- The reduced availability of moisture during dry periods, difficulty in achieving proper rooting depth, and soil compaction during tree planting may cause a high rate of seedling mortality
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- The use of some types of equipment may be restricted during wet seasons or when flooding occurs

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness due to flooding may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: Vw
Woodland management group: 27
Pasture management group: 8

KcE—Kellison loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 30 to 65 acres
Native vegetation: Pine forest

Composition

Kellison and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Keltys and Kurth soils are loamy and are in slightly higher positions on the slope
- Lovelady soils have a sandy surface at least 20 inches thick and are in slightly higher positions on the slope

Typical Profile

Surface layer:
0 to 3 inches—moderately acid, very dark grayish brown loam

Subsurface layer:
3 to 7 inches—moderately acid, pale brown loam

Subsoil:
7 to 22 inches—strongly acid, light brownish gray clay with yellowish brown and grayish brown relict mottles
22 to 30 inches—strongly acid, light brownish gray clay with yellowish brown and grayish brown relict mottles
30 to 39 inches—very strongly acid, light brownish gray clay with light yellowish brown relict mottles
39 to 47 inches—very strongly acid, light yellowish brown clay with light brownish gray relict mottles

Underlying layer:
47 to 65 inches—very strongly acid, olive and gray layered shale with clay texture

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very high
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Steepness of slope may cause severe road-surface or road-ditch erosion

Minor limitations:
- Slope may restrict the use of some types of equipment during management operations

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- On steeper slopes, water runoff is higher and less water enters the root zone for plant production
- Steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIe
Woodland management group: 21
Pasture management group: 13

KeB—Keltys fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Very gently sloping
Shape of areas: Oblong
Size of areas: 25 to 75 acres
Native vegetation: Pine forest

Composition

Keltys and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Herty and Moswell soils have a clayey subsoil and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 6 inches—strongly acid, dark grayish brown fine sandy loam

Subsurface layers:
6 to 11 inches—strongly acid, brown fine sandy loam
11 to 18 inches—strongly acid, very pale brown fine sandy loam with yellowish brown masses of iron accumulation and light brownish gray iron depletions

Subsoil:
18 to 25 inches—very strongly acid, yellowish brown fine sandy loam with yellowish brown masses of iron accumulation and light brownish gray streaks
25 to 50 inches—very strongly acid, light brownish gray fine sandy loam to loam and yellowish brown loam
50 to 57 inches—very strongly acid, olive brown clay loam with strong brown masses of iron accumulation and light brownish gray streaks

Underlying layers:
57 to 63 inches—very strongly acid, pale olive clay loam with olive brown and brownish yellow masses of iron accumulation
63 to 80 inches—extremely acid, light brownish gray mudstone that has texture of clay with yellowish brown mottles

Soil Properties and Qualities

Depth: Deep
Drainage class: Moderately well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland and cropland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes; forage yields are high and there are no major soil-related limitations to management

Minor limitations:
- Moderate capacity to store water slightly lowers the potential forage production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of the surface and ground water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 18
Pasture management group: 5

KeD—Keltys fine sandy loam, 5 to 8 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping
Shape of areas: Long and narrow
Size of areas: 15 to 25 acres
Native vegetation: Pine forest

Composition

Keltys and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Kellison and Moswell soils have a clayey subsoil and are in slightly lower landscape positions

Typical Profile

Surface layers:
0 to 4 inches—strongly acid, dark brown fine sandy loam
4 to 8 inches—strongly acid, brown fine sandy loam

Subsurface layer:
8 to 17 inches—strongly acid, brown fine sandy loam with very pale brown masses of iron accumulation

Subsoil:
17 to 28 inches—very strongly acid, brownish yellow fine sandy loam with dark grayish brown, grayish brown, and pale brown streaks
28 to 53 inches—very strongly acid, grayish brown fine sandy loam with yellowish brown, yellowish red, red, brownish yellow, and pale brown streaks

Underlying layer:
53 to 80 inches—moderately acid, light yellowish brown and light gray mudstone

Soil Properties and Qualities

Depth: Deep
Drainage class: Moderately well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderate
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Moderate capacity to store water slightly lowers the potential forage production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures and organic matter are applied, this soil is very productive

Interpretive Groups

Land capability classification: IVe
Woodland management group: 18
Pasture management group: 5

KfC—Kirvin fine sandy loam, 2 to 5 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Ridges and knolls
Slope: Gently sloping
Shape of areas: Long and narrow
Size of areas: 25 to 100 acres
Native vegetation: Pine-hardwood forest

Composition

Kirvin and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Betis and Darco soils are sandy to a depth of at least 40 inches and are in slightly higher landscape positions
- Lilbert soils are sandy to a depth of 20 to 40 inches and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 5 inches—slightly acid, brown fine sandy loam

Subsurface layer:
5 to 11 inches—slightly acid, very pale brown fine sandy loam

Subsoil:
11 to 23 inches—very strongly acid, dark red clay
23 to 46 inches—very strongly acid, red clay with yellowish brown mottles
46 to 56 inches—very strongly acid, red sandy clay with yellowish brown and dark red mottles

Underlying layer:
56 to 74 inches—very strongly acid, stratified red soft sandstone with texture of fine sandy loam and grayish brown shale

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
• None
Minor limitations:
• None

Pasture and hayland

Major limitations:
• This soil is moderately well suited to the production of grasses and legumes
Minor limitations:
• Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
• Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
• This soil has a moderate potential for the loss of fertilizer and chemicals by erosion and leaching; care should be exercised in the application of fertilizer and pesticides, along with needed erosion-control measures, to prevent contamination of water supplies
Minor limitations:
• Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 18
Pasture management group: 9

KgC—Kirvin gravelly fine sandy loam, 2 to 5 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Ridges and knolls
Slope: Gently sloping
Shape of areas: Round to long
Size of areas: 10 to 40 acres
Native vegetation: Pine-hardwood forest

Composition

Kirvin and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

• Darco and Lilbert soils are sandy to a depth of at least 20 inches and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 5 inches—strongly acid, very dark grayish brown gravelly fine sandy loam

Subsurface layer:
5 to 11 inches—strongly acid, light yellowish brown gravelly fine sandy loam

Subsoil:
11 to 29 inches—strongly acid, yellowish red clay with red mottles
29 to 38 inches—very strongly acid, variegated red, yellowish red, and strong brown clay
38 to 48 inches—very strongly acid, red clay with light brownish gray and strong brown mottles

Underlying layer:
48 to 60 inches—very strongly acid, red sandstone and light brownish gray shale

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Slope may cause a moderate rate of erosion following harvesting or other disturbance
- Low soil strength may limit equipment use when this soil is wet

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- None

Minor limitations:
- This soil has a moderate potential for loss of fertilizer and chemicals by leaching; selection of chemicals with a low potential for leaching and proper application of fertilizer elements will help to reduce the risk of ground-water contamination

Interpretive Groups

Land capability classification: IVe
Woodland management group: 20
Pasture management group: 9

KhC—Kirvin soils, graded, 2 to 8 percent slopes

Setting

Landform: Uplands
Distinctive landform features: Desurfaced
Landform position: Knolls and ridges
Slope: Very gently sloping to moderately sloping
Shape of areas: Round to long
Size of areas: 10 to 60 acres
Native vegetation: Pine-hardwood forest

Composition

Kirvin and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Darco and Lilbert soils are sandy to a depth of at least 20 inches and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 4 inches—very strongly acid, red clay loam with reddish yellow mottles

Subsoil:
4 to 19 inches—very strongly acid, red clay with light yellowish brown mottles
19 to 36 inches—very strongly acid, reddish brown clay with strong brown, reddish yellow, and brown mottles
36 to 45 inches—very strongly acid, variegated dark reddish brown, red, brownish yellow, and light gray clay

Underlying layer:
45 to 70 inches—very strongly acid, variegated dark reddish brown, brown, and light gray stratified sandstone and shale

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Shallow rooting depth causes a moderate rate of seedling mortality
- Slope may cause a moderate rate of erosion following harvesting or other disturbance
- Low soil strength may limit equipment use when this soil is wet

Pasture and hayland

Major limitations:
- Production is limited due to the lack of topsoil and clayey texture, which allows for slower infiltration of water and nutrients through the plant root zone, resulting in low inherent soil

Minor limitations:
- Production is severely limited by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil is not suited to cropland due to the lack of topsoil

Minor limitations:
- This soil has a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: VIe
Woodland management group: 31
Pasture management group: 19

Ko—Kosse sandy clay loam, occasionally flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Irregular
Size of areas: 40 to 90 acres
Native vegetation: Savannah

Composition

Kosse and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Kaufman and Texark soils are clayey throughout and are in slightly lower landscape positions
- Hainesville soils are sandy throughout and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 15 inches—slightly acid, very dark gray sandy clay loam

Subsoil:
15 to 23 inches—neutral, dark grayish brown sandy clay loam with dark gray organic films on surfaces of prisms
23 to 32 inches—slightly alkaline, dark gray sandy clay loam with dark gray organic films on surfaces of prisms
32 to 44 inches—slightly alkaline, light yellowish brown sandy clay loam with dark gray organic films on surfaces of prisms
44 to 80 inches—slightly alkaline, pale yellow and brownish yellow loam with yellowish brown masses of iron accumulation and light brownish gray iron depletions and dark gray organic films on surfaces of peds

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Apparent at 3.5 to 6 feet during December through May
Hazard of flooding: Occasional; brief duration
Runoff: Low
Permeability: Moderate
Available water capacity: High
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: Moderate
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland and cropland
Other uses: Woodland

Woodland

Major limitations:
- The reduced availability of moisture during dry periods, difficulty in achieving proper rooting depth, and soil compaction during tree planting may cause a high rate of seedling mortality

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high or flooding occurs
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- Seasonal wetness due to flooding may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection
- This soil has a moderate potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIw
Woodland management group: 9
Pasture management group: 2

Kp—Koury silt loam, frequently flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Long and narrow
Size of areas: 25 to 75 acres
Native vegetation: Pine-hardwood forest

Composition

Koury and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Ozias soils are clayey throughout

Typical Profile

Surface layer:
0 to 9 inches—strongly acid, dark grayish brown silt loam

Subsoil:
9 to 18 inches—very strongly acid, brown silt loam with yellowish brown masses of iron accumulation and grayish brown strippings
18 to 30 inches—very strongly acid, brown silt loam with yellowish brown masses of iron accumulation
30 to 54 inches—very strongly acid, grayish brown loam with dark yellowish brown masses of iron accumulation and light gray iron depletions
54 to 62 inches—strongly acid, brown very fine sandy loam with grayish brown iron depletions
62 to 80 inches—slightly acid, brown loam with yellowish brown masses of iron accumulation and light brownish gray iron depletions

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: More than 6 feet
Hazard of flooding: Frequent; brief duration
Runoff: Negligible
Permeability: Moderately slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high or flooding occurs
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness due to flooding may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a moderate potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: Vw
Woodland management group: 1
Pasture management group: 4

KuB—Kurth fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Very gently sloping
Shape of areas: Oblong to irregular
Size of areas: 30 to 85 acres
Native vegetation: Pine forest

Composition

Kurth and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Herty and Moswell soils have a clayey subsoil within 12 inches of the surface and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 6 inches—strongly acid, grayish brown fine sandy loam

Subsurface layers:
6 to 11 inches—strongly acid, pale brown fine sandy loam
11 to 20 inches—strongly acid, light yellowish brown fine sandy loam

Subsoil:
20 to 28 inches—very strongly acid, brownish yellow sandy clay loam with strong brown and red masses of iron accumulation
28 to 40 inches—very strongly acid, strong brown sandy clay loam with dark red masses of iron accumulation and light brownish gray iron depletions
40 to 65 inches—very strongly acid, light brownish gray clay loam with dark red and strong brown masses of iron accumulation

Underlying layer:
65 to 80 inches—very strongly acid, grayish brown mudstone with texture of clay loam with light brownish gray iron depletions and dark red masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Perched at 3.5 to 6 feet during January through April
Hazard of flooding: None
Runoff: Low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Moderate capacity to store water slightly lowers the potential forage production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of the surface and ground water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 10
Pasture management group: 5

KuD—Kurth fine sandy loam, 5 to 8 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping
Shape of areas: Long and narrow
Size of areas: 5 to 40 acres
Native vegetation: Pine forest

Composition

Kurth and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Kellison and Moswell soils have a clayey subsoil within 12 inches of the surface and are in slightly lower landscape positions

Typical Profile

Surface layers:
0 to 2 inches—moderately acid, dark grayish brown fine sandy loam
2 to 6 inches—moderately acid, brown fine sandy loam

Subsurface layers:
6 to 11 inches—strongly acid, pale brown fine sandy loam with brownish yellow masses of iron accumulation
11 to 22 inches—strongly acid, very pale brown fine sandy loam with yellow masses of iron accumulation

Subsoil:
22 to 29 inches—strongly acid, yellowish brown sandy clay loam with light brownish gray iron depletions
29 to 37 inches—strongly acid, yellowish brown sandy clay loam with light brownish gray iron depletions and dark red masses of iron accumulation
37 to 40 inches—strongly acid, brownish yellow sandy clay loam with red masses of iron accumulation and light brownish gray iron depletions
40 to 62 inches—very strongly acid, light brownish gray clay loam with red and brownish yellow masses of iron accumulation

Underlying layer:
62 to 80 inches—very strongly acid, stratified grayish brown, light gray, gray, and light brownish gray layered mudstone

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Perched at 3.5 to 6 feet during January through April
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Moderate capacity to store water slightly lowers the potential forage production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IVe
Woodland management group: 10
Pasture management group: 5

LaA—LaCerda clay loam, 0 to 1 percent slopes

Setting

Landform: Uplands
Distinctive landform features: Gilgai
Landform position: Toeslopes
Slope: Nearly level
Shape of areas: Broad and irregular
Size of areas: 100 to 150 acres
Native vegetation: Hardwood-pine forest

Composition

LaCerda and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Latex soils are loamy throughout and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, dark brown clay loam

Subsoil:
4 to 9 inches—strongly acid, yellowish brown clay with brownish yellow relict mottles
9 to 22 inches—moderately acid, yellowish brown clay with red and light brownish gray relict mottles
22 to 31 inches—moderately acid, light olive brown clay with yellowish brown relict mottles
31 to 38 inches—moderately acid, variegated light brownish gray and brownish yellow clay
38 to 47 inches—moderately acid, light brownish gray clay with brownish yellow relict mottles

Underlying layer:
47 to 80 inches—neutral, light brownish gray shale with pale brown, pinkish gray, and yellowish brown lithochromic mottles

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted during wet seasons
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil has a high potential for leaching and a moderate potential for loss of fertilizers and pesticides by soil erosion; to prevent contamination of ground water and surface water, the proper application rates of fertilizers, selection of chemicals with a low potential for leaching, and good erosion-control measures are needed in the management of this soil
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIw
Woodland management group: 21
Pasture management group: 7

LaB—LaCerda clay loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: Gilgai
Landform position: Stream divides
Slope: Very gently sloping
Shape of areas: Broad and irregular
Size of areas: 40 to 150 acres
Native vegetation: Hardwood-pine forest

Composition

LaCerda and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Latex soils are loamy throughout and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, dark brown clay loam with brown relict mottles

Subsoil:
4 to 15 inches—very strongly acid, red silty clay with light brownish gray relict mottles
15 to 34 inches—very strongly acid, variegated grayish brown and yellowish red clay
34 to 49 inches—strongly acid, gray clay with red and yellowish brown relict mottles

Underlying layer:
49 to 80 inches—neutral, layered brownish yellow shale with texture of clay with grayish brown streaks

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The abundance of moisture may cause competition for sunlight between seedlings and other plants
- The use of some types of equipment may be restricted during wet seasons

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Inadequate fertility are easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil has a high potential for leaching and a moderate potential for loss of fertilizers and pesticides by soil erosion; to prevent contamination of ground water and surface water, the proper application rates of fertilizers, selection of chemicals with a low potential for leaching, and good erosion-control measures are needed in the management of this soil
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 21
Pasture management group: 7

LaE—LaCerda clay loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: Gilgai
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 25 to 50 acres
Native vegetation: Hardwood-pine forest

Composition

LaCerda and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Attoyac, Austonio, and Woden soils are loamy throughout and are in lower landscape positions

Typical Profile

Surface layer:
0 to 3 inches—strongly acid, grayish brown clay loam

Subsoil:
3 to 6 inches—strongly acid, strong brown clay
6 to 10 inches—very strongly acid, yellowish red clay with yellowish brown relict mottles
10 to 21 inches—very strongly acid, red clay with yellowish brown and light brownish gray relict mottles
21 to 43 inches—very strongly acid, yellowish brown clay with gray and light gray relict mottles

Underlying layer:
43 to 80 inches—very strongly acid, weathered strong brown and yellowish brown stratified shale and sandstone

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very high
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Low strength may severely restrict the use of roads during wet seasons
- Steepness of slope severely restricts the use of equipment during management operations

Minor limitations:
- Road-ditch erosion may be a problem due to slope

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIe
Woodland management group: 21
Pasture management group: 13

Lc—Laneville loam, frequently flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Long and narrow
Size of areas: 25 to 60 acres
Native vegetation: Pine-hardwood forest

Composition

Laneville and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Ozias and Pophers soils have poor drainage and are in slightly lower areas

Typical Profile

Surface layers:
0 to 5 inches—moderately acid, dark brown loam with strong brown masses of iron accumulation
5 to 12 inches—strongly acid, brown loam with yellowish brown masses of iron accumulation

Subsoil:
12 to 34 inches—strongly acid, variegated dark yellowish brown or yellowish brown and grayish brown loam
34 to 49 inches—strongly acid, grayish brown clay loam with yellowish brown, yellowish red, and red masses of iron accumulation
49 to 65 inches—moderately acid, dark gray clay with dark red and yellowish brown masses of iron accumulation
65 to 87 inches—neutral, dark gray clay with brown masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Perched at 1.5 to 3 feet during November through May
Hazard of flooding: Frequent; brief duration
Runoff: Very low
Permeability: Slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: Low to moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high or flooding occurs
- Wetness will restrict road use when the water table is high or during periods of flooding

Pasture and hayland

Major limitations:
- This soil is very well suited to the production of grasses and legumes

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness due to flooding may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: Vw
Woodland management group: 5
Pasture management group: 4

LeB—Latex loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides and knolls
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 25 to 40 acres
Native vegetation: Pine-hardwood forest

Composition

Latex and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Etoile, Woodtell, and LaCerda soils have a clayey subsoil and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 4 inches—moderately acid, very dark grayish brown loam

Subsoil:
4 to 15 inches—strongly acid, strong brown loam
15 to 28 inches—strongly acid, brownish yellow clay loam with light yellowish brown and yellowish red masses of iron accumulation
28 to 35 inches—strongly acid, brownish yellow clay loam with light yellowish brown and red masses of iron accumulation
35 to 43 inches—strongly acid, variegated dark red and yellowish brown clay with light brownish gray streaks
43 to 56 inches—strongly acid, variegated reddish yellow and yellowish red clay with gray streaks
56 to 71 inches—strongly acid, brown clay with brownish yellow masses of iron accumulation and light brownish gray iron depletions
71 to 80 inches—strongly acid, yellowish brown clay with light brownish gray iron depletions

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: Perched at 3 to 4.5 feet during January through April
Hazard of flooding: None
Runoff: Low
Permeability: Slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland and woodland
Other uses: Cropland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is very well suited to the production of grasses and legumes

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of the surface and ground water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures and organic matter are applied, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 10
Pasture management group: 1

LtC—Lilbert loamy fine sand, 2 to 5 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Gently sloping
Shape of areas: Irregular
Size of areas: 20 to 60 acres
Native vegetation: Pine-hardwood forest

Composition

Lilbert and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Sacul soils have a loamy surface, a clayey subsoil within 15 inches, and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 5 inches—moderately acid, brown loamy fine sand

Subsurface layer:
5 to 27 inches—strongly acid, very pale brown loamy fine sand

Subsoil:
27 to 38 inches—very strongly acid, strong brown sandy clay loam
38 to 43 inches—very strongly acid, strong brown sandy clay loam with red and light gray mottles
43 to 54 inches—very strongly acid, strong brown sandy clay loam with red and light gray mottles
54 to 80 inches—very strongly acid, dark red sandy clay loam with strong brown and light gray mottles

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very low
Permeability: Surface and subsurface—rapid; subsoil—moderately slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Pastureland and cropland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- The low available water capacity of this soil may cause moderate seedling mortality
- The low available water capacity causes competition for moisture between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water
- High amounts of organic matter are needed on this soil to help hold adequate amounts of moisture in the root zone and to reduce leaching of plant nutrients

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIs
Woodland management group: 11
Pasture management group: 12

LvC—Lovelady loamy sand, 1 to 5 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Gently sloping
Shape of areas: Oblong
Size of areas: 30 to 50 acres
Native vegetation: Pine forest

Composition

Lovelady and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Moswell soils have a loamy surface, a dense clayey subsoil within 12 inches, and are in slightly lower landscape positions

Typical Profile

Surface layers:
0 to 4 inches—slightly acid, very dark grayish brown loamy sand
4 to 11 inches—moderately acid, dark grayish brown loamy sand

Subsurface layer:
11 to 26 inches—moderately acid, pale brown loamy fine sand

Subsoil:
26 to 42 inches—moderately acid, yellowish brown sandy clay loam with yellowish red masses of iron accumulation and very pale brown streaks
42 to 50 inches—strongly acid, yellowish brown fine sandy loam with dark yellowish brown masses of iron accumulation and pale brown streaks
50 to 62 inches—very strongly acid, light brownish gray clay loam with dark red and brownish yellow masses of iron accumulation and pale brown streaks
62 to 70 inches—extremely acid, light brownish gray sandy clay loam with dark red and light brown masses of iron accumulation
70 to 76 inches—extremely acid, light gray sandy clay loam with red, dark red, and light gray masses of iron accumulation
76 to 80 inches—extremely acid, light grayish brown sandy clay loam with pale yellow and dark red mottles

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very low
Permeability: Surface and subsurface—rapid; subsoil—moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland and pastureland
Other uses: Cropland

Woodland

Major limitations:
- The reduced availability of moisture during dry periods may cause a high rate of seedling mortality

Minor limitations:
- The sandy surface may interfere with equipment use during dry periods

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water
- High amounts of organic matter are needed on this soil to help hold adequate amounts of moisture in the root zone and to reduce leaching of plant nutrients

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIs
Woodland management group: 16
Pasture management group: 12

LvD—Lovelady loamy sand, 5 to 8 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping
Shape of areas: Long and narrow
Size of areas: 25 to 40 acres
Native vegetation: Pine forest

Composition

Lovelady and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Moswell soils have a loamy surface and a clayey subsoil within 12 inches

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, dark gray loamy sand

Subsurface layers:
4 to 17 inches—strongly acid, brown loamy fine sand
17 to 24 inches—strongly acid, pale brown loamy fine sand

Subsoil:
24 to 41 inches—strongly acid, brownish yellow sandy clay loam with pale brown streaks
41 to 54 inches—very strongly acid, brownish yellow sandy clay loam with dark red masses of iron accumulation and pale brown streaks
54 to 67 inches—very strongly acid, light gray sandy clay with dark red masses of iron accumulation

Underlying layer:
67 to 81 inches—very strongly acid, light gray sandy clay loam with yellowish red and strong brown mottles

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Surface and subsurface—rapid; subsoil—moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- The loose, sandy surface and steep slopes severely restrict the use of equipment during management operations

Minor limitations:
- Slope may cause a moderate rate of erosion following harvesting or other disturbance

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: IVe
Woodland management group: 16
Pasture management group: 12

MoA—Mollville loam, 0 to 1 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Nearly level
Shape of areas: Oblong
Size of areas: 25 to 35 acres
Native vegetation: Hardwood forest

Composition

Mollville and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Annona soils have a clayey subsoil, are not as wet, and are in slightly higher landscape positions
- Besner soils are not as wet and are in slightly higher landscape positions
- Hainesville soils are sandy throughout, are not as wet, and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 2 inches—strongly acid, dark grayish brown loam with pale brown stains

Subsurface layer:
2 to 10 inches—strongly acid, pale brown loam with dark brown and grayish brown masses of iron accumulation

Subsoil:
10 to 22 inches—strongly acid, light grayish brown silt loam with strong brown masses of iron accumulation and very pale brown streaks
22 to 28 inches—strongly acid, brown silt loam with very pale brown streaks
28 to 40 inches—strongly acid, very dark grayish brown silt loam with strong brown masses of iron accumulation and very pale brown streaks
40 to 63 inches—very strongly acid, dark grayish brown clay loam with strong brown masses of iron accumulation and light brownish gray iron depletions
63 to 84 inches—very strongly acid, light gray fine sandy loam with grayish brown and strong brown masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Poorly drained
Water table: Perched at 0.5 to 1 foot during November through March
Hazard of flooding: None
Runoff: Negligible
Permeability: Slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Wetness from flooding, ponding, or a high water table severely restricts the use of equipment
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- Poor drainage may cause moderate pine seedling mortality

Pasture and hayland

Major limitations:
- This soil is moderately suited or poorly suited to the production of grasses and legumes

Minor limitations:
- Severe wetness, water ponding on the surface, and poor internal drainage limit production
- Extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: IVw
Woodland management group: 23
Pasture management group: 15

MpA—Mollville-Besner complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Mounded
Landform position: Toeslopes; Mollville—concave, low areas; Besner—mounds
Slope: Nearly level to very gently sloping
Shape of areas: Oblong
Size of areas: 20 to 45 acres
Native vegetation: Hardwood-pine forest

Composition

Mollville and similar soils: 45 percent
Besner and similar soils: 40 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Annona soils have a clayey subsoil and are in slightly higher landscape positions
- Hainesville soils are sandy throughout, are not as wet, and are in higher landscape positions

Typical Profile

Mollville

Surface layer:
0 to 7 inches—very strongly acid, grayish brown loam with yellowish brown masses of iron accumulation

Subsurface layer:
7 to 14 inches—very strongly acid, light brownish gray loam with yellowish brown masses of iron accumulation

Subsoil:
14 to 30 inches—very strongly acid, grayish brown clay loam with brown masses of iron accumulation
30 to 44 inches—very strongly acid, grayish brown clay loam with dark grayish brown masses of iron accumulation
44 to 52 inches—very strongly acid, grayish brown clay loam with dark grayish brown and yellowish brown masses of iron accumulation
52 to 80 inches—strongly acid, light brownish gray fine sandy loam with strong brown masses of iron accumulation

Besner

Surface layer:
0 to 5 inches—moderately acid, brown fine sandy loam

Subsurface layers:
5 to 14 inches—moderately acid, pale brown fine sandy loam
14 to 36 inches—moderately acid, yellowish brown fine sandy loam

Subsoil:
36 to 46 inches—strongly acid, variegated pale brown and brownish yellow fine sandy loam
46 to 61 inches—strongly acid, reddish yellow loam with reddish yellow masses of iron accumulation and very pale brown streaks
61 to 80 inches—very strongly acid, brownish yellow loam with strong brown masses of iron accumulation and light gray streaks

Soil Properties and Qualities

Depth: Very deep
Drainage class: Mollville—poorly drained; Besner—well drained
Water table: Mollville—perched at 0.5 to 1 foot during November through March; Besner—apparent at 4 to 6 feet during January and February
Hazard of flooding: None
Runoff: Negligible
Permeability: Mollville—slow; Besner—moderate
Available water capacity: Mollville—high; Besner—moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Mollville—moderate; Besner—low
Water erosion hazard: Mollville—slight; Besner—moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Mollville—wetness from ponding or a high water table severely restricts the use of equipment
- Mollville—low strength may severely restrict the use of roads during wet seasons
- Mollville—abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts
- Mollville—long duration of wetness due to ponding or a high water table makes this soil unsuited for pine management

Minor limitations:
- None

Pasture and hayland

Major limitations:
- These soils are moderately suited or poorly suited to the production of grasses and legumes

Minor limitations:
- Mollville—severe wetness, water ponding on the surface, and poor internal drainage limit production
- Mollville—extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced
- Besner—Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- Mollville—seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection
- Besner—a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Mollville—a low potential for loss of fertilizers and pesticides by erosion or leaching
- Besner—moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures and organic matter are applied, this soil is very productive

Interpretive Groups

Land capability classification: Mollville—IVw; Besner—IIe
Woodland management group: Mollville—23; Besner—10
Pasture management group: Mollville—15; Besner—1

MsB—Moswell loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Very gently sloping
Shape of areas: Broad and irregular
Size of areas: 35 to 80 acres
Native vegetation: Pine forest

Composition

Moswell and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Fuller, Keltys, and Kurth soils are loamy throughout and are in slightly lower landscape positions
- Lovelady soils have a sandy surface, a loamy subsoil, and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 3 inches—moderately acid, dark grayish brown loam

Subsurface layer:
3 to 6 inches—strongly acid, pale brown loam with light gray and strong brown relict masses of iron accumulation

Subsoil:
6 to 11 inches—very strongly acid, yellowish red clay with strong brown relict masses of iron accumulation
11 to 17 inches—strongly acid, yellowish red clay with pale brown relict iron depletions
17 to 23 inches—very strongly acid, variegated red and light brownish gray clay
23 to 46 inches—very strongly acid, light brownish gray clay with red relict masses of iron accumulation

Underlying layer:
46 to 80 inches—very strongly acid, horizontally bedded layers of light brownish gray, strong brown, and yellowish brown shale with a clay texture

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high
- Low strength may limit road use by heavy equipment

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 15
Pasture management group: 9

MsE—Moswell loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 50 to 75 acres
Native vegetation: Pine forest

Composition

Moswell and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Keltys and Kurth soils are loamy throughout and are in slightly higher landscape positions
- Lovelady soils have a sandy surface, a loamy subsoil, and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 3 inches—strongly acid, brown loam

Subsurface layer:
3 to 6 inches—strongly acid, pale brown loam

Subsoil:
6 to 16 inches—strongly acid, red clay with grayish brown relict iron depletions and yellowish brown relict masses of iron accumulation
16 to 22 inches—strongly acid, grayish brown clay with red relict masses of iron accumulation
22 to 47 inches—very strongly acid, light brownish gray clay with red and strong brown relict masses of iron accumulation

Underlying layers:
47 to 59 inches—very strongly acid, pale brown shale with red and yellow mottles
59 to 80 inches—very strongly acid, light yellowish brown mudstone

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very high
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Low strength may severely restrict the use of roads during wet periods

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high or flooding occurs

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- On steeper slopes, water runoff is greater and less water enters the root zone for plant production
- Steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIe
Woodland management group: 15
Pasture management group: 13

MxA—Moten-Multey complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Mounds
Landform position: Toeslopes; Moten—concave, low areas between mounds; Multey—mounds
Slope: Nearly level to very gently sloping
Shape of areas: Oblong
Size of areas: 30 to 100 acres
Native vegetation: Hardwood-pine forest

Composition

Moten and similar soils: 55 percent
Multey and similar soils: 35 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Hainesville soils are sandy throughout, are not as wet, and are in higher landscape positions

Typical Profile

Moten

Surface layer:
0 to 4 inches—strongly acid, dark brown fine sandy loam

Subsurface layer:
4 to 23 inches—strongly acid, light brownish gray fine sandy loam with yellowish brown and brown masses

Subsoil:
23 to 38 inches—strongly acid, grayish brown fine sandy loam with very pale brown streaks
38 to 56 inches—neutral, grayish brown loam with brownish yellow masses of iron accumulation and very pale brown streaks
56 to 64 inches—neutral, dark grayish brown loam and light olive brown silty clay loam with light gray streaks

Underlying layer:
64 to 80 inches—slightly acid, light olive brown silt loam

Multey

Surface layer:
0 to 5 inches—strongly acid, grayish brown fine sandy loam

Subsurface layers:
5 to 14 inches—strongly acid, brown fine sandy loam
14 to 22 inches—slightly acid, pale brown fine sandy loam
22 to 29 inches—strongly acid, brown fine sandy loam and yellowish brown loam with light brownish gray streaks
29 to 39 inches—strongly acid, pale brown fine sandy loam and brownish yellow loam with light brownish gray streaks

Subsoil:
39 to 57 inches—very strongly acid, brownish yellow loam with red, dark yellowish brown, and light brownish gray relict masses of iron accumulation and pale brown and light yellowish brown streaks
57 to 62 inches—very strongly acid, grayish brown very fine sandy loam with brownish yellow relict masses of iron accumulation

Underlying layer:
62 to 80 inches—very strongly acid, brownish yellow and grayish brown stratified fine sandy loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moten—somewhat poorly drained; Multey—well drained
Water table: Moten—perched at 2.5 to 5 feet during January through April; Multey—more than 6 feet
Hazard of flooding: None
Runoff: Moten—very low; Multey—low
Permeability: Moten—slow; Multey—moderate

Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Moten—the use of some types of equipment may be restricted when the water table is high
- Moten—poor drainage may cause moderate pine seedling mortality
- Moten—the abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- These soils are moderately suited or poorly suited to the production of grasses and legumes

Minor limitations:
- Moten—extreme wetness, water ponding on the surface, and poor internal drainage limit production
- Moten—extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced
- Multey—soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- Moten—seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection
- Multey—a high potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Moten—a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk
- Mutley—moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures and organic matter are applied, this soil is very productive

Interpretive Groups

Land capability classification: Moten—IIw; Multey—IIs
Woodland management group: Moten—12; Multey—18
Pasture management group: Moten—15; Multey—1

NaG—Naclina clay loam, 15 to 35 percent slopes, eroded

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Escarpment side slopes
Slope: Moderately steep to steep
Shape of areas: Long and narrow
Size of areas: 50 to 130 acres
Native vegetation: Hardwood-pine forest

Composition

Naclina and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Darco and Tenaha soils have a sandy surface more than 20 inches thick and a loamy subsoil

Typical Profile

Surface layer:
0 to 3 inches—slightly acid, very dark grayish brown clay loam

Subsoil:
3 to 9 inches—strongly acid, red clay with dark brown relict masses of iron accumulation
9 to 16 inches—strongly acid, strong brown clay with brown relict masses of iron accumulation
16 to 29 inches—slightly acid, light olive brown clay with yellowish red relict masses of iron accumulation
29 to 41 inches—slightly alkaline, variegated grayish brown, yellowish brown, and brownish yellow clay

Underlying layer:
41 to 80 inches—slightly alkaline, dark brown shale with a clay texture

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very high
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Severe

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Steepness of slope severely restricts the use of equipment during management operations
- Steepness of slope may cause severe road-surface or road-ditch erosion
- Steepness of slope may cause a rapid rate of erosion following harvesting or other disturbance

Minor limitations:
- The low available water capacity of this soil may cause moderate seedling mortality
- The low available water capacity causes competition for moisture between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is not suited to pastureland due to steepness of slope

Minor limitations:
- Production is severely limited by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIe
Woodland management group: 29
Pasture management group: 19

Nc—Naconiche mucky sandy loam, 0 to 2 percent slopes

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level to very gently sloping
Shape of areas: Long and narrow
Size of areas: 25 to 40 acres
Native vegetation: Pine-hardwood forest

Composition

Naconiche and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Rentzel soils are moderately well drained and have a loamy subsoil

Typical Profile

Surface layers:
0 to 8 inches—very strongly acid, black mucky sandy loam with gray spots of sand
8 to 14 inches—strongly acid, black mucky sandy loam
14 to 25 inches—strongly acid, black loamy fine sand with dark gray and gray spots of sand

Underlying layers:
25 to 38 inches—strongly acid, gray fine sand with very dark gray and gray spots of sand
38 to 55 inches—strongly acid, gray to light gray fine sand with white spots of sand
55 to 80 inches—strongly acid, light brownish gray fine sand with white spots of sand

Soil Properties and Qualities

Depth: Very deep
Drainage class: Very poorly drained
Water table: Apparent at 0 to 1 foot throughout the year in most years
Hazard of flooding: Frequent; long to very long duration
Runoff: Negligible
Permeability: Moderately rapid
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Long duration of wetness due to flooding or a high water table makes this soil unsuited for pine management
- Wetness severely restricts road use when the water table is high or during periods of flooding
- Wetness from flooding, ponding, or a high water table severely restricts the use of equipment
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is not suited to pastureland due to frequent flooding and high water table

Minor limitations:
- Flooding and wetness interfere with the establishment, maintenance, and harvesting of the forage produced
- Severe wetness, water ponding on the surface, and poor internal drainage limit production

Cropland

Major limitations:
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIIw
Woodland management group: 4
Pasture management group: 19

Nh—Nahatche loam, frequently flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Long and narrow
Size of areas: 20 to 50 acres
Native vegetation: Hardwood-pine forest

Composition

Nahatche and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Ozias soils are clayey throughout and are wetter

Typical Profile

Surface layers:
0 to 5 inches—moderately acid, dark grayish brown loam
5 to 9 inches—moderately acid, variegated dark grayish brown, brown, yellowish brown, and dark brown fine sandy loam

Subsoil:
9 to 24 inches—neutral, dark grayish brown clay loam with dark yellowish brown masses of iron accumulation
24 to 40 inches—slightly acid, dark grayish brown clay loam with yellowish brown and brown masses of iron accumulation
40 to 54 inches—slightly acid, grayish brown loam with yellowish brown masses of iron accumulation and streaks of light gray clean sand

Buried surface layers:
54 to 69 inches—neutral, dark gray clay loam with dark yellowish brown masses of iron accumulation and streaks of light gray clean sand
69 to 80 inches—neutral, dark gray clay loam with dark yellowish brown masses of iron accumulation and streaks of light gray clean sand

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat poorly drained
Water table: Apparent at 0.5 foot to 1.5 feet during November through May
Hazard of flooding: Frequent; very brief to brief duration
Runoff: Negligible
Permeability: Moderate
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Wetness from flooding, ponding, or a high water table severely restricts the use of equipment
- Low strength may severely restrict the use of roads during wet seasons

Minor limitations:
- Poor drainage may cause moderate pine seedling mortality

Pasture and hayland

Major limitations:
- This soil is poorly suited or very poorly suited to the production of grasses and legumes

Minor limitations:
- Severe wetness, water ponding on the surface, flooding, and poor internal drainage limit production
- Extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness due to flooding may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: Vw
Woodland management group: 3
Pasture management group: 17

Oz—Ozias-Pophers complex, frequently flooded

Setting

Landform: Flood plains
Distinctive landform features: Mounds
Landform position: Mounded bottomlands; Ozias—concave, low areas between mounds; Pophers—mounds
Slope: Nearly level
Shape of areas: Irregular
Size of areas: 50 to 175 acres
Native vegetation: Hardwood forest

Composition

Ozias and similar soils: 45 percent
Pophers and similar soils: 40 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Iulus soils are less clayey throughout, are not as wet, and are in slightly higher positions on the flood plain
- Hainesville soils are sandy throughout, are not as wet, and are in higher landscape positions

Typical Profile

Ozias

Surface layer:
0 to 5 inches—very strongly acid, dark grayish brown silty clay loam with strong brown masses of iron accumulation

Subsoil:
5 to 15 inches—very strongly acid, grayish brown silty clay with yellowish brown masses of iron accumulation
15 to 28 inches—very strongly acid, grayish brown silty clay with yellowish brown and strong brown masses of iron accumulation
28 to 40 inches—very strongly acid, grayish brown silty clay with strong brown masses of iron accumulation
40 to 63 inches—very strongly acid, gray silty clay with strong brown masses of iron accumulation
63 to 80 inches—very strongly acid, gray silty clay with strong brown and dark gray masses of iron accumulation

Pophers

Surface layer:
0 to 5 inches—very strongly acid, brown silty clay loam
5 to 18 inches—strongly acid, light grayish brown silty clay loam

Subsoil:
18 to 30 inches—strongly acid, dark grayish brown silty clay loam with light brownish gray iron depletions
30 to 47 inches—very strongly acid, dark gray silty clay with light brownish gray iron depletions
47 to 60 inches—strongly acid, dark gray silty clay with light brownish gray iron depletions
60 to 69 inches—strongly acid, dark gray silty clay with light brownish gray iron depletions
69 to 80 inches—strongly acid, dark grayish brown silty clay with light brownish gray iron depletions

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat poorly drained
Water table: Ozias—perched at 0 to 1.5 feet during December through May; Pophers—apparent at 1 foot to 2 feet during January through June
Hazard of flooding: Frequent; long duration
Runoff: Ozias—low; Pophers—very low
Permeability: Ozias—very slow; Pophers—moderately slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Ozias—high; Pophers—moderate
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Wetness from flooding, ponding, or a high water table severely restricts the use of equipment
- Wetness may cause a high rate of seedling mortality

Minor limitations:
- Abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- These soils are poorly suited to the production of grasses and legumes

Minor limitations:
- Severe wetness, water ponding on the surface, flooding, and poor internal drainage limit production
- Extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Flooding and seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- A low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: Vw
Woodland management group: 3
Pasture management group: 17

PeB—Penning very fine sandy loam, 0 to 4 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Toeslopes and drainageways
Slope: Nearly level to gently sloping
Shape of areas: Oblong
Size of areas: 35 to 75 acres
Native vegetation: Pine forest

Composition

Penning and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Herty and Moswell soils have a clayey subsoil within 12 inches and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 4 inches—moderately acid, brown very fine sandy loam with dark brown masses of iron accumulation

Subsurface layers:
4 to 9 inches—strongly acid, brown very fine sandy loam with brownish yellow masses of iron accumulation
9 to 19 inches—strongly acid, pale brown very fine sandy loam with brownish yellow masses of iron accumulation

Subsoil:
19 to 24 inches—strongly acid, yellowish brown fine sandy loam with grayish brown iron depletions and light brownish gray streaks
24 to 38 inches—very strongly acid, brownish yellow loam with grayish brown iron depletions and light brownish gray streaks
38 to 50 inches—very strongly acid, brownish yellow sandy clay loam with yellowish red masses of iron accumulation and light brownish gray streaks
50 to 56 inches—moderately acid, grayish brown sandy clay loam with brownish yellow masses of iron accumulation and light brownish gray streaks

Underlying layer:
56 to 70 inches—neutral, light brownish gray shale with a texture of clay

Soil Properties and Qualities

Depth: Deep
Drainage class: Moderately well drained
Water table: Perched at 1.5 to 4 feet during January through April
Hazard of flooding: None
Runoff: Very low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- Low strength may limit the use of roads by heavy equipment
- Road-ditch erosion may be a problem due to slope

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Slightly wet conditions during the winter and early spring may interfere with harvesting hay, the grazing rotation, or the use of equipment
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 12
Pasture management group: 6

PnA—Percilla clay loam, 0 to 1 percent slopes

Setting

Landform: Uplands
Distinctive landform features: Depressional areas
Landform position: Low, concave areas on toeslopes
Slope: Nearly level
Shape of areas: Round
Size of areas: 15 to 40 acres
Native vegetation: Hardwood forest

Composition

Percilla and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Alto soils are moderately well drained and are in higher landscape positions
- Chireno soils are moderately well drained and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, grayish brown clay loam

Subsoil:
4 to 18 inches—strongly acid, light brownish gray and yellowish brown clay
18 to 39 inches—very strongly acid, light brownish gray and strong brown clay
39 to 75 inches—very strongly acid, light gray, yellowish brown, brownish yellow, and yellow clay

Underlying layer:
75 to 83 inches—neutral, stratified strong brown, yellowish brown, and light olive brown weathered glauconitic material with texture of loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Poorly drained

Water table: Seasonal water stands on the surface for several days after most rains; perched at +1 to 0.5 foot during January through March
Hazard of flooding: None
Runoff: Negligible
Permeability: Very slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Slight

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Wetness may cause a high rate of seedling mortality
- Wetness severely restricts road use when the water table is high or during wet seasons
- Wetness from ponding or a high water table severely restricts the use of equipment
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is moderately suited or poorly suited to the production of grasses and legumes

Minor limitations:
- Extreme wetness, water ponding on the surface, and poor internal drainage limit production
- Extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: IVw
Woodland management group: 24
Pasture management group: 15

Po—Pophers silt loam, frequently flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Irregular
Size of areas: 50 to 110 acres
Native vegetation: Hardwood forest

Composition

Pophers and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Iulus soils have less silt and clay, are not as wet, and are in slightly higher landscape positions
- Hainesville soils are sandy throughout, are not as wet, and are in higher landscape positions

Typical Profile

Surface layer:
0 to 10 inches—strongly acid, dark grayish brown silt loam with strong brown stains
10 to 16 inches—very strongly acid, grayish brown silty clay loam with grayish brown masses of iron accumulation

Subsoil:
16 to 23 inches—very strongly acid, dark grayish brown silty clay loam with yellowish brown masses of iron accumulation and gray iron depletions
23 to 30 inches—very strongly acid, grayish brown silty clay loam with yellowish brown masses of iron accumulation
30 to 61 inches—very strongly acid, grayish brown silty clay loam with pale brown masses of iron accumulation and light gray iron depletions
61 to 82 inches—very strongly acid, dark grayish brown silty clay loam with dark yellowish brown stains

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat poorly drained
Water table: Apparent at 1 foot to 2 feet during January through June
Hazard of flooding: Frequent; brief duration
Runoff: Very low
Permeability: Moderately slow
Available water capacity: High
Root zone: Very deep

Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- Wetness from flooding, ponding, or a high water table severely restricts the use of equipment
- Wetness severely restricts road use when the water table is high or during periods of flooding
- Wetness may cause a high rate of seedling mortality

Minor limitations:
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is poorly suited to the production of grasses and legumes

Minor limitations:
- Extreme wetness, water ponding on the surface, flooding, and poor internal drainage limit production
- Extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a low potential for loss of fertilizers and pesticides by erosion or leaching

Interpretive Groups

Land capability classification: Vw
Woodland management group: 3
Pasture management group: 17

PsA—Portersprings fine sandy loam, 0 to 1 percent slopes

Setting

Landform: Low stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Nearly level
Shape of areas: Oblong
Size of areas: 40 to 80 acres
Native vegetation: Savannah

Composition

Portersprings and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Kaufman soils have a clayey texture throughout and are in slightly lower flood-prone areas
- Hainesville soils are sandy throughout and are in slightly higher landscape positions

Typical Profile

Surface layers:
0 to 9 inches—very strongly acid, very dark grayish brown fine sandy loam
9 to 16 inches—very strongly acid, very dark grayish brown fine sandy loam with yellowish brown masses of iron accumulation

Subsoil:
16 to 22 inches—very strongly acid, dark grayish brown sandy clay loam with strong brown masses of iron accumulation
22 to 29 inches—very strongly acid, dark yellowish brown sandy clay loam with strong brown and red masses of iron accumulation
29 to 51 inches—very strongly acid, yellowish brown fine sandy loam with strong brown masses of iron accumulation
51 to 72 inches—moderately acid to slightly alkaline, brownish yellow to yellowish brown loamy fine sand with strong brown and dark yellowish brown masses of iron accumulation

Underlying layer:
72 to 87 inches—slightly alkaline, very pale brown fine sand with yellowish brown masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: Rare
Runoff: Negligible
Permeability: Moderate
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium

Shrink-swell potential: Low
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Flooding and slight wetness in some years may interfere with the establishment, maintenance, and harvesting of the forage produced
- Inadequate fertility is easily corrected with additions of fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIw
Woodland management group: 13
Pasture management group: 2

RnB—Rentzel loamy fine sand, 0 to 4 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Toeslopes
Slope: Nearly level to gently sloping
Shape of areas: Long and narrow
Size of areas: 5 to 35 acres
Native vegetation: Pine-hardwood forest

Composition

Rentzel and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Sacul soils have a loamy surface, a clayey subsoil within 15 inches, and are in slightly lower landscape positions
- Naconiche soils have a mollic surface and are very poorly drained

Typical Profile

Surface layer:
0 to 6 inches—moderately acid, dark brown loamy fine sand

Subsurface layer:
6 to 26 inches—strongly acid, yellowish brown loamy fine sand

Subsoil:
26 to 50 inches—very strongly acid, yellowish brown and brownish yellow sandy clay loam with grayish brown and brownish gray iron depletions and strong brown masses of iron accumulation
50 to 59 inches—very strongly acid, variegated light brownish gray, pale brown, strong brown, and yellowish red sandy clay loam
59 to 80 inches—very strongly acid, brownish yellow fine sandy loam with gray iron depletions and yellowish red masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained
Water table: Perched at 1.5 to 3 feet during January through March
Hazard of flooding: None
Runoff: Low
Permeability: Surface and subsurface—rapid; subsoil—moderately slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted when the water table is high
- Poor drainage may cause moderate pine seedling mortality
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer
- Slightly wet conditions during winter and early spring may interfere with harvesting hay, the grazing rotation, or the use of equipment

Cropland

Major limitations:
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: IIIw
Woodland management group: 12
Pasture management group: 11

SaB—Sacul fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Toeslopes or footslopes
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 20 to 50 acres
Native vegetation: Pine-hardwood forest

Composition

Sacul and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Darco, Lilbert, and Rentzel soils have a sandy surface at least 20 inches thick, a loamy subsoil, and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 8 inches—strongly acid, dark brown fine sandy loam

Subsurface layer:
8 to 16 inches—strongly acid, light yellowish brown fine sandy loam

Subsoil:
16 to 21 inches—very strongly acid, red clay with light brownish gray relict iron depletions
21 to 26 inches—very strongly acid, dark red clay with light brownish gray relict iron depletions
26 to 48 inches—very strongly acid, light brownish gray clay loam with dark red masses of iron accumulation

Underlying layer:
48 to 65 inches—very strongly acid, alternating layers of red sandstone with a texture of fine sandy loam and light gray shale with a texture of clay loam

Soil Properties and Qualities

Depth: Deep
Drainage class: Moderately well drained
Water table: Perched at 2 to 4 feet during December through April
Hazard of flooding: None
Runoff: Medium
Permeability: Slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Low strength may limit road use by heavy equipment
- The use of some types of equipment may be restricted when the water table is high

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for leaching and a moderate potential for loss of fertilizers and pesticides by soil erosion; to prevent contamination of ground water and surface water, proper application rates of fertilizers, selection of chemicals with a low potential for leaching, and good erosion-control measures are needed in the management of this soil

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 14
Pasture management group: 9

SwA—Sawlit-Latex complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: Mounds
Landform position: Toeslopes; Sawlit—low, concave areas between mounds; Latex—mounds
Slope: Nearly level to very gently sloping
Shape of areas: Oblong
Size of areas: 20 to 45 acres
Native vegetation: Pine-hardwood forest

Composition

Sawlit and similar soils: 55 percent
Latex and similar soils: 30 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Mollville soils have a clayey subsoil, are poorly drained, and are in similar positions

Typical Profile

Sawlit

Surface layer:
0 to 7 inches—strongly acid, dark brown loam with dark brown masses of iron accumulation

Subsoil:
7 to 22 inches—strongly acid, brownish yellow loam with yellowish red masses of iron accumulation and brownish gray iron depletions and very pale brown streaks
22 to 33 inches—very strongly acid, yellowish brown sandy clay loam with red masses of iron accumulation and gray iron depletions and light gray streaks
33 to 49 inches—very strongly acid, variegated dark red, strong brown, and gray clay loam
49 to 62 inches—very strongly acid, gray clay loam with brownish yellow and dark reddish brown masses of iron accumulation
62 to 80 inches—very strongly acid, variegated red, light gray, and brownish yellow clay

Latex

Surface layer:
0 to 6 inches—very strongly acid, dark brown fine sandy loam

Subsurface layer:
6 to 20 inches—very strongly acid, brown fine sandy loam with dark yellowish brown stains

Subsoil:
20 to 27 inches—very strongly acid, yellowish brown loam with yellowish red masses of iron accumulation
27 to 36 inches—very strongly acid, yellowish brown sandy clay loam with dark red masses of iron accumulation
36 to 45 inches—very strongly acid, yellowish brown sandy clay loam with reddish brown masses of iron accumulation and light gray streaks
45 to 61 inches—very strongly acid, variegated red, light gray, and yellowish brown sandy clay loam
61 to 80 inches—very strongly acid, variegated red, strong brown, and gray clay loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Moderately well drained

Water table: Sawlit—perched at 2 to 3.5 feet during January through May; Latex—perched at 3 to 4.5 feet during December through April
Hazard of flooding: None
Runoff: Sawlit—very low; Latex—medium
Permeability: Sawlit—very slow; Latex—slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Sawlit—moderate; Latex—slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- These soils are well suited to the production of grasses and legumes

Minor limitations:
- Sawlit—slightly wet conditions during the winter and early spring may interfere with harvesting hay, the grazing rotation, or the use of equipment
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- Sawlit—seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection
- These soils have a moderate potential for leaching and a high potential for the erosion loss of topsoil and applied chemicals; proper chemical selection and good erosion-control measures are necessary to prevent soil deterioration and contamination of the surface and ground water

Minor limitations:
- Latex—moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures and organic matter are applied, this soil is very productive

Interpretive Groups

Land capability classification: Sawlit—IIw; Latex—IIe
Woodland management group: Sawlit—12; Latex—10
Pasture management group: Sawlit—6; Latex—1

TaE—Tenaha loamy fine sand, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 75 to 120 acres
Native vegetation: Pine-hardwood forest

Composition

Tenaha and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Cuthbert soils have a loamy surface, a clayey subsoil, and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, dark grayish brown loamy fine sand

Subsurface layer:
4 to 23 inches— strongly acid, light yellowish brown and pale brown loamy fine sand

Subsoil:
23 to 34 inches— strongly acid, strong brown sandy clay loam with dark reddish brown and yellowish red masses of iron accumulation
34 to 58 inches—very strongly acid or strongly acid, variegated dark reddish brown, dark red, yellowish brown, and light grayish brown sandy clay loam

Underlying layer:
58 to 80 inches—very strongly acid, variegated light gray and dark red shale with a texture of clay loam and brownish yellow, strong brown, and light gray sandstone with a texture of fine sandy loam

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained

Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Surface and subsurface—rapid; subsoil—moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Severe

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- The droughty nature of this soil may cause a high rate of seedling mortality
- Erosion hazard is severe when trees are harvested due to steepness of slope
- The loose, sandy surface may severely restrict equipment use during dry periods

Minor limitations:
- The low available water capacity causes competition for moisture between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately suited or poorly suited to the production of grasses and legumes

Minor limitations:
- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage available for plant production
- On steeper slopes, equipment use is impaired due to the loose, sandy surface

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- This soil has a moderate potential for loss of fertilizer and chemicals by leaching; the selection of chemicals with a low potential for leaching and correct application of fertilizer elements will help to reduce the risk of subsurface water contamination

Interpretive Groups

Land capability classification: VIe
Woodland management group: 16
Pasture management group: 16

Te—Texark clay, occasionally flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Broad and irregular
Size of areas: 50 to 200 acres
Native vegetation: Savannah

Composition

Texark and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Hainesville soils are sandy throughout, are not as wet, and are in higher landscape positions
- Kosse and Portersprings soils are loamy throughout, are not as wet, and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 16 inches—slightly acid, very dark gray clay

Subsoil:
16 to 56 inches—slightly acid, dark gray clay with brownish masses of iron accumulation
56 to 80 inches—slightly acid, dark gray clay with brownish masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat poorly drained
Water table: Apparent at 2 to 3.5 feet during December through May
Hazard of flooding: Occasional; brief duration
Runoff: Low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Cropland and pastureland
Other uses: Woodland

Woodland

Major limitations:
- Wetness from flooding or ponding severely restricts the use of equipment
- Poor drainage may cause rutting and severely restricts the use of roads during wet seasons
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:
- Poor drainage may cause moderate pine seedling mortality

Pasture and hayland

Major limitations:
- This soil is poorly suited to the production of grasses and legumes

Minor limitations:
- Extreme wetness, water ponding on the surface, flooding, and poor internal drainage limit production
- Extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:
- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should be given to crop selection

Minor limitations:
- This soil has a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: IIIw
Woodland management group: 27
Pasture management group: 17

Tf—Texark clay, frequently flooded

Setting

Landform: Flood plains
Distinctive landform features: None
Landform position: Bottomland flats
Slope: Nearly level
Shape of areas: Broad and irregular
Size of areas: 75 to 125 acres
Native vegetation: Savannah

Composition

Texark and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Hainesville soils are sandy throughout, are not as wet, and are in higher landscape positions
- Kosse and Portersprings soils are loamy throughout, are not as wet, and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 13 inches—slightly acid, very dark gray clay

Subsoil:
13 to 26 inches—slightly acid, dark gray clay with strong brown masses of iron accumulation
26 to 52 inches—neutral, dark gray clay with dark yellowish brown masses of iron accumulation
52 to 63 inches—neutral, dark gray clay with dark yellowish brown masses of iron accumulation and gray iron depletions
63 to 80 inches—neutral, grayish brown clay with dark grayish brown masses of iron accumulation

Soil Properties and Qualities

Depth: Very deep
Drainage class: Somewhat poorly drained
Water table: Apparent at 2 to 3.5 feet during December through May
Hazard of flooding: Frequent; long duration
Runoff: Very low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: High
Shrink-swell potential: High
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland
Other uses: Woodland

Woodland

Major limitations:
- Wetness from flooding, ponding, or a wet season severely restricts the use of equipment

- Wetness severely restricts road use during wet seasons or flooding periods
- Abundant moisture causes competition for sunlight and space from invading plants to severely reduce the success of regeneration efforts

Minor limitations:

- Poor drainage may cause moderate pine seedling mortality

Pasture and hayland

Major limitations:

- This soil is not suited to pastureland due to frequent flooding

Minor limitations:

- Extreme wetness interferes with the establishment, maintenance, and harvesting of the forage produced

Cropland

Major limitations:

- This soil is not suited to cropland due to frequent flooding

Minor limitations:

- Seasonal wetness may delay crop planting; due to the wetness problem, careful consideration should go into crop selection

Interpretive Groups

Land capability classification: Vw
Woodland management group: 27
Pasture management group: 19

ToC—Tonkawa fine sand, 0 to 8 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Nearly level to moderately sloping
Shape of areas: Irregular
Size of areas: 40 to 100 acres
Native vegetation: Pine-hardwood forest

Composition

Tonkawa and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Cuthbert and Sacul soils have a loamy surface, a clayey subsoil within 20 inches, and are in slightly lower landscape positions

Typical Profile

Surface layer:
0 to 6 inches—strongly acid, dark brown fine sand

Subsoil:
6 to 27 inches—strongly acid, light yellowish brown fine sand with very pale brown spots
27 to 46 inches—strongly acid, very pale brown fine sand with white spots
46 to 70 inches—strongly acid, very pale brown fine sand
70 to 82 inches—strongly acid, very pale brown fine sand with reddish yellow thin bands

Soil Properties and Qualities

Depth: Very deep
Drainage class: Excessively drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Very low
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Shrink-swell potential: Low
Water erosion hazard: Severe

Land Use

Dominant uses: Pastureland and woodland
Other uses: Cropland

Woodland

Major limitations:

- The droughty nature of this soil may cause a high rate of seedling mortality

Minor limitations:

- The sandy surface may interfere with equipment use during dry periods
- Low strength may limit road use by heavy equipment

Pasture and hayland

Major limitations:

- This soil is poorly suited to the production of grasses and legumes

Minor limitations:

- Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage available for plant production
- On steeper slopes, equipment use is impaired due to the loose, sandy surface

Cropland

Major limitations:
- High amounts of organic matter are needed on this soil to help hold adequate amounts of moisture in the root zone and to reduce leaching of plant nutrients

Minor limitations:
- This soil has a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: IVs
Woodland management group: 30
Pasture management group: 18

TrE—Trawick fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 45 to 75 acres
Native vegetation: Pine-hardwood forest

Composition

Trawick and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Darco and Tenaha soils have a sandy surface at least 20 inches thick, a loamy subsoil, and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 2 inches—strongly acid, dark brown fine sandy loam
2 to 4 inches—strongly acid, reddish brown fine sandy loam

Subsoil:
4 to 12 inches—strongly acid, red clay with strong brown mottles
12 to 19 inches—strongly acid, red clay with yellow mottles
19 to 39 inches—strongly acid, red clay with yellowish red and brownish yellow mottles

Underlying layer:
39 to 43 inches—moderately acid, stratified red, light gray, and brownish yellow weathered glauconitic material

Soil Properties and Qualities

Depth: Moderately deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Slope may restrict the use of some types of equipment during management operations
- Road-ditch erosion may be a problem due to slope
- Slope may cause a moderate rate of erosion following harvesting or other disturbance

Pasture and hayland

Major limitations:
- This soil is moderately well suited or moderately suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- On steeper slopes, water runoff is greater and less water enters the root zone for plant production
- Increased slope also increases the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- This soil has a high potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil

Interpretive Groups

Land capability classification: VIe
Woodland management group: 20
Pasture management group: 13

TwC—Trawick gravelly fine sandy loam, 2 to 5 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Knobs and ridges
Slope: Gently sloping
Shape of areas: Long and narrow
Size of areas: 10 to 30 acres
Native vegetation: Pine-hardwood forest

Composition

Trawick and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Darco and Tenaha soils have a sandy surface at least 20 inches thick, a loamy subsoil, and are in lower landscape positions

Typical Profile

Surface layer:
0 to 4 inches—neutral, dark reddish brown gravelly fine sandy loam in the upper part and dark reddish brown gravelly sandy clay loam in the lower part
4 to 10 inches—neutral, dark reddish brown gravelly sandy clay loam

Subsoil:
10 to 38 inches—slightly acid or neutral, dark red, brownish yellow, and yellowish red clay

Underlying layer:
38 to 48 inches—slightly acid, brown, dark brown, and brownish yellow weathered glauconitic material with texture of sandy clay

Soil Properties and Qualities

Depth: Moderately deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Low soil strength may limit equipment use when this soil is wet

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil is not suited to cropland due to the gravelly surface

Minor limitations:
- This soil has a medium potential for erosion loss of nutrients and pesticides that could possibly contaminate surface water; the needed erosion-control measures should be applied to reduce this risk

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 20
Pasture management group: 9

TwE—Trawick gravelly fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 25 to 45 acres
Native vegetation: Pine-hardwood forest

Composition

Trawick and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Darco and Tenaha soils have a sandy surface at least 20 inches thick, a loamy subsoil, and are in higher landscape positions

Typical Profile

Surface layer:
0 to 4 inches—strongly acid, dark reddish brown gravelly fine sandy loam

Subsoil:
4 to 10 inches—strongly acid, dark red clay
10 to 38 inches—strongly acid, dark red clay with brownish yellow and yellowish red mottles

Underlying layer:
38 to 56 inches—strongly acid, dark brown stratified glauconitic materials with brownish yellow and dark red mottles

Soil Properties and Qualities

Depth: Moderately deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Slope may restrict the use of some types of equipment during management operations
- Road-ditch erosion may be a problem due to slope
- Slope may cause a moderate rate of erosion following harvesting or other disturbance

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- On steeper slopes, water runoff is greater and less water enters the root zone for plant production
- Steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope and gravelly surface

Minor limitations:
- This soil has a high potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil

Interpretive Groups

Land capability classification: VIe
Woodland management group: 20
Pasture management group: 13

TxG—Trawick-Bub complex, 15 to 40 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately steep to steep
Shape of areas: Long and narrow
Size of areas: 35 to 50 acres
Native vegetation: Pine-hardwood forest

Composition

Trawick and similar soils: 60 percent
Bub and similar soils: 30 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Darco and Tenaha soils have a sandy surface at least 20 inches thick, a loamy subsoil, and are in slightly higher landscape positions

Typical Profile

Trawick

Surface layer:
0 to 4 inches—slightly acid, dark reddish brown gravelly fine sandy loam

Subsoil:
4 to 12 inches—moderately acid, red clay
12 to 20 inches—neutral, yellowish red clay
20 to 38 inches—neutral, strong brown clay

Underlying layer:
38 to 60 inches—neutral, stratified light olive brown, olive yellow, and olive brown weathered glauconitic material

Bub

Surface layer:
0 to 6 inches—slightly acid, dark reddish brown fine sandy loam

Subsoil:
6 to 10 inches—slightly acid, red clay with strong brown mottles
10 to 19 inches—strongly acid, strong brown clay with red mottles

Underlying layer:
19 to 50 inches—moderately acid, alternate layers of yellowish red, strong brown, and light gray weathered glauconitic materials

Soil Properties and Qualities

Depth: Trawick—moderately deep; Bub—shallow
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Trawick—high; Bub—very high
Permeability: Trawick—moderately slow; Bub—very slow
Available water capacity: Trawick—moderate; Bub—low
Root zone: Trawick—moderately deep; Bub—shallow
Natural soil fertility: Medium
Shrink-swell potential: Moderate
Water erosion hazard: Trawick—moderate; Bub—severe

Land Use

Dominant uses: Woodland
Other uses: None

Woodland

Major limitations:
- None

Minor limitations:
- Slope may restrict the use of some types of equipment during management operations
- Road-ditch erosion may be a problem due to slope
- Slope may cause a moderate rate of erosion following harvesting or other disturbance
- Bub—shallow rooting depth causes a moderate rate of seedling mortality

Pasture and hayland

Major limitations:
- Slopes are too steep to safely put these areas into pasture

Minor limitations:
- Steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
- These soils are not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: Trawick—VIIe; Bub—VIIs
Woodland management group: Trawick—22; Bub—29
Pasture management group: 19

WnB—Woden fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Stream terraces
Distinctive landform features: None
Landform position: Toeslopes
Slope: Very gently sloping
Shape of areas: Oblong
Size of areas: 30 to 60 acres
Native vegetation: Pine-hardwood forest

Composition

Woden and similar soils: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions

- Annona soils have a clayey subsoil and are in slightly lower landscape positions
- Derly soils have a clayey subsoil, are poorly drained, and are in depressions

Typical Profile

Surface layer:
0 to 12 inches—strongly acid, brown fine sandy loam

Subsoil:
12 to 36 inches— slightly acid, strong brown fine sandy loam
36 to 52 inches— slightly acid, yellowish red fine sandy loam
52 to 74 inches— slightly acid, yellowish red fine sandy loam and loam
74 to 80 inches— slightly acid, strong brown fine sandy loam

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Negligible
Permeability: Moderately rapid
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Shrink-swell potential: Low
Water erosion hazard: Slight

Land Use

Dominant uses: Pastureland and Woodland
Other uses: Cropland

Woodland

Major limitations:
- None

Minor limitations:
- None

Pasture and hayland

Major limitations:
- This soil is well suited to the production of grasses and legumes

Minor limitations:
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a moderate potential for loss of topsoil, fertilizer, insecticides, and herbicides by erosion; a good erosion-control program is necessary to prevent soil loss and contamination of surface water

Minor limitations:
- Moderate amounts of organic matter are needed to maintain the tilth and water-holding capacity of this soil; when adequate erosion-control measures are applied and organic matter maintained, this soil is very productive

Interpretive Groups

Land capability classification: IIe
Woodland management group: 6
Pasture management group: 1

WoB—Woodtell very fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Stream divides
Slope: Very gently sloping
Shape of areas: Oblong to broad
Size of areas: 30 to 45 acres
Native vegetation: Hardwood-pine forest

Composition

Woodtell and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Latex soils are loamy throughout and are in slightly higher landscape positions

Typical Profile

Surface layer:
0 to 5 inches—strongly acid, very dark grayish brown very fine sandy loam

Subsoil:
5 to 18 inches—very strongly acid, red clay with pale brown mottles
18 to 25 inches—very strongly acid, red clay with light brownish gray mottles
25 to 33 inches—very strongly acid, variegated red and light brownish gray clay
33 to 56 inches—very strongly acid, variegated dark red and light brownish gray clay

Underlying layer:
56 to 80 inches—moderately acid, stratified light brownish gray shale with a texture of clay and yellowish red and strong brown soft sandstone with a texture of fine sandy loam

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- The use of some types of equipment may be restricted during winter and spring
- Low strength may limit road use by heavy equipment
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- Soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer

Cropland

Major limitations:
- This soil has a high potential for leaching of chemicals and fertilizers into the ground water; selection of chemicals with a short half-life and a low potential for leaching, along with proper application methods, are needed to properly manage this soil
- High amounts of organic matter should be returned to the soil to help maintain soil infiltration and soil tilth; other erosion-control measures, such as terraces and contour farming, are often needed

Minor limitations:
- None

Interpretive Groups

Land capability classification: IIIe
Woodland management group: 21
Pasture management group: 9

WoE—Woodtell very fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Distinctive landform features: None
Landform position: Side slopes
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 30 to 75 acres
Native vegetation: Hardwood-pine forest

Composition

Woodtell and similar soils: 90 percent
Contrasting inclusions: 10 percent

Contrasting Inclusions

- Darco and Tenaha soils have a sandy surface at least 20 inches thick, a loamy subsoil, and are in lower landscape positions

Typical Profile

Surface layer:
0 to 6 inches—moderately acid, dark brown very fine sandy loam

Subsoil:
6 to 29 inches—strongly acid, dark red clay with pale brown mottles
29 to 48 inches—strongly acid, red clay with light brownish gray mottles

Underlying layer:
48 to 80 inches—strongly acid, stratified light brownish gray, brownish yellow, and strong brown shale

Soil Properties and Qualities

Depth: Deep
Drainage class: Well drained
Water table: More than 6 feet
Hazard of flooding: None

Runoff: Very high
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Shrink-swell potential: High
Water erosion hazard: Moderate

Land Use

Dominant uses: Woodland
Other uses: Pastureland

Woodland

Major limitations:
- None

Minor limitations:
- Slope may restrict the use of some types of equipment during management operations
- Road-ditch erosion is a hazard due to steepness of slope
- Slope causes a moderate erosion hazard following harvesting or other disturbance
- The abundance of moisture may cause competition for sunlight between seedlings and other plants

Pasture and hayland

Major limitations:
- This soil is moderately well suited to the production of grasses and legumes

Minor limitations:
- Production is decreased slightly by the clayey subsoil, which limits water intake and storage for plant production
- On steeper slopes, water runoff is greater and less water enters the root zone for plant production
- Increased slope also increases the hazard of excessive erosion during pasture establishment or renovation and in pastures that are overgrazed

Cropland

Major limitations:
- This soil is not suited to cropland due to steepness of slope

Minor limitations:
- None

Interpretive Groups

Land capability classification: VIe
Woodland management group: 21
Pasture management group: 13

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 245,836 acres, or nearly 31 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed below. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading “Detailed Soil Map Units.”

The soils identified as prime farmland in Houston County are:

AaB	Alazan very fine sandy loam, 0 to 2 percent slopes
AfB	Alto fine sandy loam, 1 to 3 percent slopes
AtB	Attoyac fine sandy loam, 1 to 3 percent slopes
AuB	Austonio fine sandy loam, 1 to 3 percent slopes
BaB	Bernaldo fine sandy loam, 1 to 3 percent slopes
BbA	Bernaldo-Besner complex, 0 to 2 percent slopes
BeA	Besner fine sandy loam, 0 to 2 percent slopes
BwB	Bowie fine sandy loam, 1 to 3 percent slopes
ChA	Chireno loam, 0 to 1 percent slopes
EaA	Eastham clay, 0 to 1 percent slopes
EaB	Eastham clay, 1 to 3 percent slopes
ErB	Elrose fine sandy loam, 1 to 3 percent slopes
FrB	Freestone fine sandy loam, 1 to 3 percent slopes
GaA	Garner clay, 0 to 1 percent slopes
HbC	Hallsbluff clay loam, 2 to 5 percent slopes
Hc	Hannahatchee fine sandy loam, frequently flooded
Ka	Kaufman clay, occasionally flooded
KeB	Keltys fine sandy loam, 1 to 3 percent slopes
Ko	Kosse sandy clay loam, occasionally flooded
KuB	Kurth fine sandy loam, 1 to 3 percent slopes

LeB	Latex loam, 1 to 3 percent slopes
PeB	Penning very fine sandy loam, 0 to 2 percent slopes
PsA	Portersprings fine sandy loam, 0 to 1 percent slopes
SwA	Sawlit-Latex complex, 0 to 2 percent slopes
Te	Texark clay, occasionally flooded
TwC	Trawick gravelly fine sandy loam, 2 to 5 percent slopes
WnB	Woden fine sandy loam, 1 to 3 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Crops

In 1950, an estimated 150,000 acres was being farmed in Houston County. Today, there are approximately 40,000 acres being cultivated. Important cash crops are milo, peanuts, cotton, watermelons, and vegetable truck crops. Other cropland is being used for home gardens and for livestock feed crops. Crops grown for livestock are mostly cool-season plants, such as ryegrass and/or small grains overseeded into bermudagrass pastures and “grazed out” before the warm-season grass growth begins. Some hybrid sorghums are also produced for hay or to supplement grazing of warm-season pastures.

Soils used as cropland are managed to control water erosion, maintain tilth and fertility, and, in some cases, drain off excess water. The major practices used to accomplish these purposes are:

Conservation cropping sequence. Leaving crop residue on the soil helps to control water erosion and conserve moisture. Incorporating adequate amounts of residue into the soil improves tilth, infiltration, and the available water holding capacity.

Contour farming. Terracing and farming on the contour helps to control water erosion. This is beneficial on most soils that have slopes of more than 1 percent.

Cover crops. Cover crops furnish protective cover after the crop has been harvested and before the next cultivated crop is planted. Some cover crops suited for most soils in the survey area are small

grains, vetch, winterpeas, and mixtures of annual grasses and legumes.

Fertilizer. Most crops respond well to commercial fertilizers. Soil fertility levels can be maintained if proper amounts and kinds of lime and fertilizer elements are applied.

Pest and nutrient management. Fertilizer, insecticides, and herbicides should be applied in a timely manner and according to directions to prevent the possible contamination of surface and underground water.

The soils that are most frequently cropped and/or have the highest potential for crop production are the fine sandy loams, loamy fine sands, and some fine sands.

The fine sandy loam soils, such as Alto, Attoyac, Austonio, Bowie, Kirvin, and Woden, are well suited for most crops and orchards.

The loamy fine sand soils, such as Lilbert and Tenaha, are excellent soils for orchards, melons, and peanuts but are somewhat droughty for other crops. Deeper sands, such as the Betis and Darco loamy fine sands, are even more droughty and are best suited for crops like melons and peanuts.

The Tonkawa fine sand soils are very droughty but produce good melon crops using a crop rotation of one year melons and four years grass.

The river and creek bottomland soils are important cropland soils, mainly for cotton and milo. Yields are usually very good in these slightly wet soils in years when crops can be planted at normal seeding dates.

Pasture

Raymond Dolezel, area soil scientist, Natural Resources Conservation Service, helped prepare this section.

Houston County has about 270,000 acres of improved and native pastureland. At the turn of the century more than half of the land in the county was used for crop production. As the acreage of cropland diminished, much of the cleared land was allowed to revert to native pasture (fig. 10).

Pastureland in the county is dominated by improved grasses, such as coastal bermudagrass, which have proven to greatly increase forage yields on most soils. On the wettest flood plain soils, bahiagrass and fescue produce higher yields than most other species. Weeping lovegrass is very well adapted on sandy soils.

For grazing, many of the grasses are overseeded with legumes. On wetter soils, white clovers and vetch are very well adapted. On upland soils, legumes, such as vetch or crimson clover, are grown. These cool-season legumes extend the grazing period of predominately warm-season pastures, providing quality, growing forage throughout most years, and increasing the amount of forage produced. With proper inoculation, nitrogen fixation occurs in these legumes. This reduces the need for additional commercial fertilizers, which is an important consideration in areas where water quality may be affected.

Native pastures are dominated by plants that commonly reseed naturally. Brush control is needed, and an occasional application of fertilizer and lime is helpful. Common grasses in native pastures vary with soil types. On flood plain soils, the most common grasses in properly managed pastures include carpetgrass, dallisgrass, vaseygrass, and various sedges. Sandy soils on uplands are dominated by pine hill bluestem, needlegrass, and various panicums.

If native pastures are not properly managed, the dominant species on flood plain soils are usually sedges, vaseygrass, and carpetgrass. On the uplands, the dominant species on poorly managed pastures are usually broomsedge bluestem, pine hill bluestem, and needlegrass on loamy soils and sand burs on sandy soils.

Proper management of pastureland is necessary on all soils to meet the yield potential of the grass being grown. In Houston County, brush invades all areas if not controlled by shredding or chemical applications. Liming and proper fertilization are also needed for high forage yields. Nutrients can be supplied through commercial fertilizers, manure, or other agricultural wastes, or through the use of legumes. On sandy soils, fertilizer applications of nitrogen should be split to avoid leaching losses.

While the yield may provide adequate amounts of forage, quality of forage must also be considered in managing livestock operations on pastureland. Pasture grasses that provide the required forage quality during their growing season often lack quality during dormancy. Overseeding cool-season legumes in pastures will provide the forage quality that is lacking during much of the dormant season. Otherwise, supplemental protein or hay may be required to meet animal needs.

Pasture Management Groups

The soils in Houston County have been grouped according to similar soil characteristics that affect forage production and pasture management. The yield potential of each group is based on a high level of management. Other factors that influence yields

Figure 10.—This pasture of coastal bermudagrass is in a bottomland area on Kosse sandy clay loam, occasionally flooded.

are the natural fertility of the soil, the ability of the soil to take in and store water and make it available for plant use, the positive and negative effects of wetness and flooding, the problems associated with slope and drainage, and other soil conditions that affect productivity.

Forage yield is expressed in “animal unit months” for the major grasses evaluated for the group. The term “animal unit months” represents the number of months that forage produced on one acre will feed one animal unit. For example, a yield of eight animal unit months provides forage for one animal unit for eight months. Therefore, 1.5 acres is required to provide adequate forage for one animal unit for one year. An animal unit is the equivalent to one 1,000-pound animal. Forage yields for the most commonly grown grasses are given in Table 5 for all soils suitable for use as pasture.

The following description of each pasture management group discusses the soil characteristics that affect pasture production, management problems associated with forage production, major grass and legume adaptation, and yield potential of major grasses. Each map unit is assigned to a pasture management group, which is also given in the section “Detailed Soil Map Units.”

Pasture Management Group 1. The Attoyac, Austonio, Bernaldo, Besner, Elrose, Freestone, Latex, Multey, and Woden soils in map units AbA, AtB, AuB, BaB, BbA, BeA, ErB, FrB, FsA, LeB, MpA, MxA, SwA, and WnB are in this group. These nearly level and gently sloping soils are on stream terraces. They have a loamy surface layer, a loamy subsoil, and are well drained or moderately well drained.

These soils are very well suited to the production of grasses and legumes. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses used for forage production on these soils include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover, white dutch clover, arrowleaf clover, or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about seven to nine animal unit months of grazing and hay in a normal year.

Pasture Management Group 2. The Chireno, Kosse, and Portersprings soils in map units ChA, Ko, and PsA are in this group. These nearly level soils are on low stream terraces and high flood plains. They have a clayey or loamy surface layer, a clayey subsoil, and are well drained or moderately well drained. Some areas of these soils may flood or have water on the surface for a short time.

These soils are very well suited to the production of grasses and legumes. Flooding and slight wetness in some years may interfere with establishment, maintenance, and harvesting of the forage produced. Minor limitations of inadequate fertility are easily corrected with additions of fertilizer.

Adapted grasses used for forage production on these soils include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as white dutch clover, arrowleaf clover, or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about eight or nine animal unit months of grazing and hay in a normal year.

Pasture Management Group 3. This group includes the Austonio soils in map unit AuD. These moderately sloping to moderately steep soils are on stream terraces. They have a loamy surface layer, a loamy subsoil, and are well drained.

These soils are very well suited to the production of grasses and legumes. However, on steeper slopes, water runoff is higher and less water enters the root zone for plant production. Steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation, as well as when pastures are overgrazed.

Adapted grasses used for forage production on these soils include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, about eight animal unit months of grazing and hay can be harvested in normal years from improved bermudagrass.

Pasture Management Group 4. The Hannahatchee, Iulus, Koury, and Laneville soils in map units Hc, Iu, Kp, and Lc are in this group. These nearly level soils are on flood plains of smaller streams. They have a loamy surface layer, a loamy subsoil, are well drained or moderately well drained, and may flood annually for brief duration.

These soils are very well suited to the production of grasses and legumes. Flooding and slight wetness in some years may interfere with establishment, maintenance, and the harvesting of the forage produced.

Adapted grasses used for forage production on these soils include improved bermudagrass, fescue, and bahiagrass, which can be overseeded with legumes, such as crimson clover, white clover, or vetch. With proper management, including liming, fertilizing, and rotational grazing, about seven or eight animal unit months of grazing and hay can be harvested in normal years from fescue or bahiagrass.

Pasture Management Group 5. The Bowie, Keltys, and Kurth soils in map units BwB, KeB, KeD, KuB, and KuD are in this group. These gently sloping to moderately sloping upland soils are on broad interstream divides. They have a loamy surface layer, a loamy subsoil, and are well drained or moderately well drained.

These soils are well suited to the production of grasses and legumes. However, a moderate capacity to store water slightly lowers potential forage production. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses used for forage production on these soils include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover or vetch. With proper management, including liming, fertilizing, and

rotational grazing, improved bermudagrass will produce about seven or eight animal unit months of grazing and hay in a normal year.

Pasture Management Group 6. The Alazan, Penning, and Sawlit soils in map units AaB, AbA, PeB, and SwA are in this group. These nearly level and gently sloping soils are on stream terraces or low uplands. They have a loamy surface layer, a loamy subsoil, and are moderately well drained.

These soils are well suited to the production of grasses and legumes. Slightly wet conditions during the winter and early spring may interfere with harvesting hay, grazing rotation, or using equipment. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses used for forage production on these soils include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as white dutch clover, arrowleaf clover, or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about eight animal unit months of grazing and hay in a normal year.

Pasture Management Group 7. The Eastham, Garner, Hallsbluff, and Lacerda soils in map units EaA, EaB, GaA, HbC, LaA, and LaB are in this group. These nearly level and gently sloping soils are on high stream terraces and low uplands. They have a clayey surface layer, a clayey subsoil, and are well drained or moderately well drained.

These soils are moderately well suited to the production of grasses and legumes. Production is limited slightly due to the clayey surface layer, which limits water intake and storage. Minor limitations of inadequate fertility are easily corrected with additions of fertilizer.

Adapted grasses used for forage production on these soils include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as white dutch clover, arrowleaf clover, or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about eight animal unit months of grazing and hay in a normal year.

Pasture Management Group 8. This group includes the Kaufman soils in map units Ka and Kb. These nearly level soils are on broad flood plains of the Trinity River. They have a clayey surface layer, a clayey subsoil, are moderately well drained, and may flood annually.

These soils are moderately well suited to the production of grasses and legumes. Flooding and slight wetness in some years may interfere with establishment, maintenance, and harvesting of the forage produced.

Adapted grasses used for forage production on these soils include improved bermudagrass, fescue, and bahiagrass, which can be overseeded with legumes, such as white clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, about five or six animal unit months of grazing and hay can be harvested in a normal year from fescue or bahiagrass.

Pasture Management Group 9. The Alto, Annona, Etoile, Herty, Kirvin, Moswell, Sacul, Trawick, and Woodtell soils in map units AfB, AnA, AnB, EtB, HeA, HeB, KfC, KgC, MsB, SaB, TwC, and WoB are in this group. These nearly level and gently sloping upland soils are on broad interstream divides. They have a loamy surface layer, a clayey subsoil, and are well drained or moderately well drained.

These soils are moderately well suited to the production of grasses and legumes. Production is limited slightly due to the clayey subsoil, which limits water intake and storage. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses used for forage production on these soils include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about six or seven animal unit months of grazing and hay in a normal year.

Pasture Management Group 10. This group includes the Hainesville soils in map unit HaA. These nearly level and very gently sloping soils are on stream terraces. They have a sandy surface layer, a sandy subsoil, and are somewhat excessively drained.

These soils are moderately suited to the production of grasses and legumes. Production is limited due to the thick, sandy surface layer, which allows rapid movement of water and nutrients through the plant root zone, resulting in low inherent soil fertility and limited water storage. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses used for forage production on these soils include weeping lovegrass and improved bermudagrass, which can be overseeded with

legumes, such as vetch. With proper management, including liming, split applications of fertilizer, and rotational grazing, about six animal unit months of grazing and hay can be harvested in a normal year from improved bermudagrass.

Pasture Management Group 11. This group includes the Rentzel soils in map unit RnB. These nearly level and gently sloping soils are on lower slopes of uplands. They have a sandy surface layer, a loamy or sandy subsoil, and are moderately well drained.

These soils are moderately well suited or moderately suited to the production of grasses and legumes. Production is limited due to the thick, sandy surface layer, which allows rapid movement of water and nutrients through the plant root zone, resulting in low inherent soil fertility and limited water storage. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer. Slightly wet conditions during the winter and early spring may interfere with harvesting hay, grazing rotation, or using equipment.

Adapted grasses used for forage production on these soils include weeping lovegrass and improved bermudagrass, which can be overseeded with legumes, such as vetch. With proper management, including liming, split applications of fertilizer, and rotational grazing, about seven animal unit months of grazing and hay can be harvested in a normal year from improved bermudagrass.

Pasture Management Group 12. The Betis, Darco, Grapeland, Lilbert, and Lovelady soils in map units BtC, DaC, GrB, LtC, LvC, and LvD are in this group. These gently sloping to moderately sloping upland soils are on broad interstream divides. They have a thick, sandy surface layer; a loamy subsoil; and are somewhat excessively drained or well drained.

These soils are moderately well suited or moderately suited to the production of grasses and legumes. Production is limited due to the thick, sandy surface layer, which allows rapid movement of water and nutrients through the plant root zone, resulting in low inherent soil fertility and limited water storage. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses used for forage production on these soils include weeping lovegrass and improved bermudagrass, which can be overseeded with legumes, such as vetch. With proper management, including liming, fertilizing, and rotational grazing, about six to eight animal unit months of grazing and hay can be harvested in a normal year from improved bermudagrass.

Pasture Management Group 13. The Cuthbert, Kellison, Lacerda, Moswell, Trawick, and Woodtell soils in map units CtE, CuE, KcE, LaE, MsE, TrE, TwE, and WoE are in this group. These strongly sloping to moderately steep upland soils are on broad interstream divides. They have a loamy or gravelly loamy surface layer, a clayey subsoil, and are well drained or moderately well drained.

These soils are moderately well suited or moderately suited to the production of grasses and legumes. Production is limited due to the clayey subsoil, which limits water intake and storage. Also, production is less on slopes above 10 percent since water runoff is higher, which allows less water to enter the root zone. These steeper slopes also increase the hazard of excessive erosion during pasture establishment or renovation, as well as when pastures are overgrazed.

Adapted grasses used for forage production on these soils include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, about three to five animal unit months of grazing and hay can be harvested in a normal year from improved bermudagrass.

Pasture Management Group 14. This group includes the Fuller soils in map units FuA and FuB. These nearly level to very gently sloping soils are on low uplands. They have a loamy surface layer, a loamy subsoil, and are somewhat poorly drained.

These soils are moderately suited to the production of grasses and legumes. Production is limited due to wetness and poor internal soil drainage. The wetness also interferes with the establishment, maintenance, and harvesting of the forage produced. Production is further limited by the presence of salts in the soil.

Adapted grasses used for forage production on these soils include fescue and bahiagrass, which can be overseeded with legumes, such as white clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, only about five animal unit months of grazing and hay can be harvested in a normal year from fescue or bahiagrass.

Pasture Management Group 15. The Derly, Mollville, Moten, and Percilla soils in map units FsA, MoA, MpA, MxA, and PnA are in this group. These nearly level soils are in depressions on broad, mounded stream terraces. They have a loamy surface layer, a clayey or loamy subsoil, are somewhat poorly drained or poorly drained, and may have water ponded on the surface during late winter and early spring.

These soils are moderately suited or poorly suited to the production of grasses and legumes. Production is limited due to severe wetness, ponding, and poor internal soil drainage. The extreme wetness also interferes with the establishment, maintenance, and harvesting of the forage produced. In wet years, they produce little or no forage.

Adapted grasses used for forage production on these soils include fescue and bahiagrass, which can be overseeded with legumes, such as white clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, only about three or four animal unit months of grazing and hay can be harvested in a normal year from fescue or bahiagrass.

Pasture Management Group 16. The Darco and Tenaha soils in map units DaE and TaE are in this group. These moderately sloping to moderately steep upland soils are on broad interstream divides. They have a thick, sandy surface layer; a loamy subsoil; and are somewhat excessively drained or well drained.

These soils are moderately suited or poorly suited to the production of grasses and legumes. Production is limited due to the thick, sandy surface layer, which allows rapid movement of water and nutrients through the plant root zone, resulting in low inherent soil fertility and limited water storage. Also, on slopes above 10 percent, equipment use is impaired due to the loose, sandy surface.

Adapted grasses used for forage production on these soils include weeping lovegrass and improved bermudagrass, which can be overseeded with legumes, such as vetch. With proper management, including liming, fertilizing, and rotational grazing, about three to five animal unit months of grazing and hay can be harvested in a normal year from improved bermudagrass.

Pasture Management Group 17. The Nahatche, Ozias, Pophers, and Texark soils in map units Nh, Oz, Po, and Te are in this group. These nearly level soils are on broad flood plains of larger streams. They have a loamy or clayey surface layer, a loamy or clayey subsoil, are somewhat poorly drained or poorly drained, and may flood annually.

These soils are poorly suited or very poorly suited to the production of grasses and legumes. Production is limited due to severe wetness, ponding, flooding, and poor internal soil drainage. The extreme wetness also interferes with the establishment, maintenance, and harvesting of the forage produced.

Adapted grasses used for forage production on these soils include fescue and bahiagrass, which can be overseeded with legumes, such as white clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, only about one to three animal unit months of grazing and hay can be harvested in a normal year from fescue or bahiagrass. In wet years, they produce little or no forage.

Pasture Management Group 18. This group includes the Tonkawa soils in map unit ToC. These gently sloping to sloping upland soils are on broad interstream divides. They have a sandy texture to a depth of more than 80 inches and are excessively drained.

These soils are poorly suited or very poorly suited to the production of grasses and legumes. Production is limited due to the sandy surface layer, which allows rapid movement of water and nutrients through the root zone, resulting in low inherent soil fertility and limited water storage. On steeper slopes, equipment use is impaired due to the loose, sandy surface.

Adapted grasses used for forage production on these soils include weeping lovegrass and improved bermudagrass, which can be overseeded with legumes, such as vetch. With proper management, including liming, fertilizing, and rotational grazing, about one animal unit month of grazing and hay can be harvested in a normal year from improved bermudagrass.

Pasture Management Group 19. This group includes soils that in their natural state are not suited for pasture. The Bub, Cuthbert, Naclina, and Trawick soils in map units CtG, NaG, and TxG are too steep to safely put into pasture. They are on upland escarpments and drainageways.

The Naconiche and Texark soils in map units Nc and Tf are too wet for pasture. They are on flood plains that are frequently flooded.

The Kirvin soils in map unit KhC have had the topsoil removed as a source of gravel, rendering them unproductive as pastureland. These upland soils are on broad interstream divides.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c*.

The capability classification of each map unit is given in the section “Detailed Soil Map Units” and in table 5.

Woodland Management and Productivity

Raymond R. Stoner, area forester, Natural Resources Conservation Service, helped prepare this section.

Houston County has about 425,000 acres of woodland. In addition to producing commercial wood products, recreational opportunities and important wildlife habitat are provided. By far, the largest owner group is the private landowner who owns about 250,000 acres. Large industrial landowners own about 81,000 acres, and the remaining acreage of woodland is owned by state parks and national forest.

Timber products are a major source of income for the county. Lumber, pulpwood, crossties, pallet material, stakes, and crates are manufactured from the timber produced. A grade quality hardwood mill is located in the county.

Plant habitats in Houston County range from droughty, sandy sites to frequently flooded bottomlands. The plant communities, therefore, range from shortleaf pine/sandjack oak types to willow oak/ green ash/sweetgum types. The major forest management problem in the county is the harvesting of timber without adequate reforestation follow-up.

This soil survey can be used by woodland managers in planning the use of soils for wood products. Table 6 summarizes the forest management/soils relationships and rates the soils for a number of factors to be considered in management. Only those soils suitable for wood crops are listed. A full explanation of these relationships and considerations is given in the discussion of the woodland management groups below. For convenience, soils with similar production capabilities and limitations are grouped together.

The table lists the *woodland management group* for those soils suitable for timber.

Slight, moderate, and severe are used to indicate the degree of the major soil limitations to be considered in management. These concerns or limitations are *erosion hazard, equipment limitation, seedling mortality, windthrow hazard, and plant competition*. Site factors such as soil texture, slope, wetness, and drainage determine the severity of the limitations. Along with further explanation of these limitations, alternatives that should be considered in management planning are given in the discussion of the woodland management groups below.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

The *site index* is the average height, in feet, that the trees attain in a specified number of years

The *volume* is the yield likely to be produced by the most important trees. This number is expressed in board feet (Doyle Rule) per acre per year.

Trees to plant are those used for reforestation. They are suited to the soils and can produce a commercial wood crop. The desired product, landscape position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Woodland Management Groups

The soils in Houston County that are suitable for wood crops have been placed in 31 groups according to their suitability for woodland management. Each group is made up of soils with similar properties and that respond to similar management practices. The landscape position and chemical and physical properties of the soils were considered in assigning soils to each group.

Woodland Management Group 1. The Koury soils in map unit Kp are in this group. These soils are on flood plains. They have a high water table during the winter and spring months and may also be flooded for brief duration during the same periods. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, water oak, red oak, green ash, and sweetgum. The site index for loblolly pine and sweetgum averages 100-plus feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 430 board feet per acre per year. The yield for sweetgum is approximately 310 board feet per acre per year. Although management can substantially increase these yields, it should also include attention to streamside management zone practices to protect water quality.

Flooding and a high water table may restrict access for periods during late winter and early spring months. Modified equipment, such as tandem-axled and four-wheel drive vehicles, may be needed for

much of the year. Control of shade-tolerant species, such as maple and redbay, may be needed in regeneration operations. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 2. The Hannahatchee soils in map unit Hc are in this group. These loamy soils are on small flood plains and may flood for brief duration. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, green ash, sweetgum, white oak, water oak, and cherrybark oak. The site index for loblolly pine, sweetgum, and bottomland oaks is 100-plus feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 430 board feet per acre per year. The yield for sweetgum is approximately 310 board feet per acre per year. Although management can substantially increase these yields, it should also include attention to streamside management zone practices to protect water quality.

Harvesting or management operations may be temporarily interrupted due to brief periods of flooding, but this should cause no difficulty in long-range operations. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 3. This group includes the Nahatche, Ozias, and Pophers soils in map units Nh, Oz, and Po. These loamy and clayey soils are on flood plains. They are either saturated or have a high water table during the late winter and spring months and may also flood for brief to long duration during the same periods. They are best suited to the production of hardwood trees.

Common trees of the overstory are water oak, willow oak, green ash, and sweetgum. The site index for sweetgum and bottomland oaks averages 100 feet. The yield from an unmanaged, natural stand of sweetgum over a 50-year period is approximately 310 board feet per acre per year. Although management can substantially increase this yield, it should also include attention to streamside management zone practices to protect water quality.

Wetness restricts access for periods during the late winter and spring months. Modified equipment, such as tandem-axled and four-wheel drive vehicles, is needed for much of the year. Control of invading brush and undesirable species may be needed in regeneration operations. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 4. The Naconiche soils in map unit Nc are in this group. These soils are on flood plains and are saturated throughout the year. They are best suited to the production of hardwood trees.

Common trees of the overstory are green ash, blackgum, sweetbay, sweetgum, water oak, cherrybark oak, and willow oak. The site index for sweetgum and bottomland oaks averages 100 feet. The yield from an unmanaged, natural stand of sweetgum over a 50-year period is approximately 310 board feet per acre per year. Although management can substantially increase this yield, it should also include attention to streamside management zone practices to protect water quality.

Equipment is greatly restricted due to wetness. Management and harvesting operations should be done only during dry periods. Specialized equipment and harvesting methods are needed. Control of undesirable, shade-tolerant species is necessary for successful regeneration efforts. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 5. This group includes the Iulus and Laneville soils in map units Iu and Lc. These loamy soils are on small flood plains. They have a high water table during the winter and spring months and may also flood for brief duration during the same periods. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, water oak, cherrybark oak, white ash, and sweetgum. The site index for loblolly pine and sweetgum averages 100 feet, but can range from 95 to over 110 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 430 board feet per acre per year. The yield for sweetgum is approximately 310 board feet per acre per year. Although management can substantially increase these yields, it should also include attention to streamside management zone practices to protect water quality.

Flooding and a high water table may restrict access for periods during the late winter and spring months. Modified equipment, such as tandem-axled and four-wheel drive vehicles, may be needed for much of the year. Control of invading brush and undesirable species may be needed in regeneration operations. Since areas of these soils may often be

included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 6. This group includes the Attoyac, Bernaldo, and Woden soils in map units AtB, BaB, BbA, and WnB. These loamy soils are on stream terraces. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine. shortleaf pine, sweetgum, southern red oak, water oak, and white oak. The site index for loblolly pine averages 95 feet, but can range from 90 to over 100 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 380 board feet per acre per year. The yield for sweetgum is approximately 260 board feet per acre per year. Management can substantially increase these yields.

There are no significant management problems associated with these soils.

Woodland Management Group 7. The Alazan soils in map units AaB and Ab are in this group. They are on broad, mounded terraces and have a high water table during the winter months. These soils are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, water oak, willow oak, southern red oak, and white oak. The site index for loblolly pine and sweetgum averages 95 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 380 board feet per acre per year. The yield for sweetgum is approximately 260 board feet per acre per year. Management can substantially increase these yields.

Some restriction of equipment use can be expected during the late winter and spring months due to a high water table. Care must be taken to prevent excessive rutting, especially on the flatter slopes. The abundant available moisture can lead to a competition problem for pine seedlings. Site preparation or release that will control invading brush may be necessary. During road design and layout, attention should be given to avoid extremely flat or depressional areas and to not interrupt normal drainage. Crowning and raising the roadbed may be needed. Maintenance of roads will be necessary to fill ruts and holes. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 8. The Hainesville soils in map unit HaA are in this group. These sandy soils are on stream terraces. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, southern red oak, and white ash. The site index for loblolly pine averages 95 feet, but can range from 90 to 105 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 380 board feet per acre per year. Management can substantially increase this yield.

The coarse texture of these soils may cause severe problems with equipment use, especially during dry periods. Modified equipment, such as tandem-axled, four-wheel drive, or wide-tired vehicles, may be needed during dry periods. Successful establishment of planted pine requires attention to proper planting depth and soil compaction. Planting when the soil is moist should be helpful. Control of herbaceous weeds, either during site preparation or as a release during the first growing season, may also be needed.

Woodland Management Group 9. The Kosse soils in map unit Ko are in this group. These soils are on flood plains and may flood for brief duration during the spring. They are best suited to the production of hardwood trees.

Common trees of the overstory are sweetgum, water oak, willow oak, red oak, and green ash. The site index for sweetgum and bottomland oaks averages 95 feet. The yield from an unmanaged, natural stand of sweetgum over a 50-year period is approximately 260 board feet per acre per year. Although management can substantially increase this yield, it should also include attention to streamside management zone practices to protect water quality.

Flooding may restrict access for periods during the late winter and spring months. Modified equipment, such as tandem-axled and four-wheel drive vehicles, may be needed for much of the year. Control of invading brush and undesirable, shade-tolerant species may be needed in regeneration operations. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 10. This group includes the Alto, Austonio, Besner, Bowie, Elrose, Kurth, and Latex soils in map units AbA, AfB, AuB, AuD, BbA, BeA, BwB, ErB, KuB, KuD, LeB, MpA, and SwA. These loamy soils are on terraces and low upland sites and also occur as a mounded complex with other soils, such as the Mollville-Besner

complex. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, southern red oak, water oak, and white oak. The site index for loblolly pine and sweetgum averages 90 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 330 board feet per acre per year. The yield for sweetgum is approximately 210 board feet per acre per year. Management can substantially increase these yields.

There are no significant management problems associated with these soils. However, proper road design and layout, including the installation of water-control devices, such as water bars, are important on the steeper slopes of the Austonio and Kurth soils. During road design and layout, attention should be given to avoid extremely flat or depressional areas.

Woodland Management Group 11. The Lilbert soils in map unit LtC are in this group. These sandy soils are on uplands. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, white ash, sweetgum, and hickory. The site index for loblolly pine averages 90 feet, but can range from 80 to 95 feet depending on slope and slope position. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 330 board feet per acre per year. Management can substantially increase this yield.

The coarse texture of these soils may cause equipment limitations, particularly during dry periods. Modified equipment, such as tandem-axled, four-wheel drive, or wide-tired vehicles, may be needed. Also, little available moisture may cause seedling mortality to be significant in dry years. Successful establishment of planted pine requires attention to proper planting depth and soil compaction. Planting when the soil is moist should be helpful. Control of herbaceous weeds, either during site preparation or as a release during the first growing season, may also be needed.

Woodland Management Group 12. This group includes the Freestone, Moten, Penning, Rentzel, and Sawlit soils in map units FrB, FsA, MxA, PeB, RnB, and SwA. These soils are either on broad terraces or low upland sites and may be wet during the winter and spring months due to a high water table. They are suited to the production of both pine and hardwood trees (fig. 11).

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, water oak, willow oak, southern red oak, and white oak. The site index for loblolly pine and sweetgum averages 90 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 330 board feet per acre per year. The yield for sweetgum is approximately 210 board feet per acre per year. Although management can substantially increase these yields, it should also include attention to streamside management zone practices on Rentzel soils to protect water quality.

Restriction of equipment use can be expected during the late winter and spring months due to a high water table. Care must be taken to prevent excessive rutting, especially on the flatter slopes. The abundant available moisture can lead to a competition problem for pine seedlings. Site preparation or release that will control invading brush may be necessary. During road design and layout, attention should be given to avoid extremely flat or depressional areas and to not interrupt normal drainage. Maintenance of roads will be necessary to fill ruts and holes. Since areas of Rentzel soil may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 13. The Portersprings soils in map unit PsA are in this group. These soils are on stream terraces. Due to the high pH, these soils are best suited to the production of hardwood trees.

Common trees of the overstory are water oak, green ash, pecan, and elm. The site index for water oak averages 90 feet. The yield from an unmanaged, natural stand of green ash is approximately 265 board feet per acre per year. Management can substantially increase this yield.

There are no significant management problems associated with these soils. During road design and layout, attention should be given to avoid extremely flat areas and to not interrupt normal drainage. Maintenance of roads may be necessary to fill ruts and holes.

Woodland Management Group 14. The Sacul soils in map unit SaB are in this group. These loamy soils are on rolling uplands. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, white ash, sweetgum, post oak, southern red oak, and white oak. The site index for loblolly pine averages 85 feet, but can vary significantly depending on slope position. The yield from an unmanaged, natural stand of loblolly pine

Figure 11.—This area of Penning very fine sandy loam, 0 to 4 percent slopes, is being managed for pine production.

over a 50-year period is approximately 280 board feet per acre per year. Management can substantially increase this yield.

Since clay occurs within 10 inches of the surface, particular attention should be given to tree planting methods that ensure proper root placement and soil compaction. In some cases, subsoiling before planting may be needed. The clayey subsoil may restrict equipment use during wet weather. Proper road design and layout that include the use of water-control devices, such as water bars and wing ditches, should be used.

Woodland Management Group 15. The Moswell soils in map units MsB and MsE are in this group. These loamy soils are on rolling uplands. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, southern red oak, white oak, post oak, white ash, and sweetgum. The site index for loblolly

pine averages 85 feet, but can range from 75 to 90 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 280 board feet per acre per year. The yield for sweetgum is approximately 165 board feet per acre per year. Management can substantially increase these yields.

As slopes increase, the potential for erosion increases. Therefore, care must be taken to avoid excessive uphill and downhill rutting on the steeper sites. Intensive site preparation should be limited to gentler slopes, and machine tree planting should be done on the contour. Since clay occurs within 10 inches of the surface, particular attention should be given to tree planting methods that ensure proper root placement and soil compaction. In some cases, subsoiling before planting may be needed. The clayey subsoil may restrict equipment use during wet weather. During road design, long, uninterrupted grades should be avoided, and adequate water-control devices, such as water bars and dips, should be installed. Wing ditches should be installed at intervals as close as practical, but always released onto stable outlets.

Woodland Management Group 16. This group includes the Lovelady and Tenaha soils in map units LvC, LvD, and TaE. These sandy soils are on uplands. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, post oak, southern red oak, and white oak. The site index for loblolly pine averages 85 feet, but can vary depending on slope and slope position. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 280 board feet per acre per year. Management can substantially increase this yield.

Generally, these soils are not very erosive. However, uphill and downhill rutting should be avoided, particularly on the steeper slopes. The coarse texture of these soils may restrict equipment use, particularly during dry periods. Modified equipment, such as tandem-axled, wide-tired, or four-wheel drive vehicles, may be needed, especially during the dry periods. The moderate available water capacity of these soils may result in significant seedling mortality during dry years. Successful establishment of planted pine requires attention to proper planting depth and soil compaction. Planting when the soil is moist should be helpful. Control of herbaceous weeds, either during site preparation or as a release during the first growing season, may also be necessary. As slopes increase, the need for proper road design, including the installation of water-control devices, such as water bars, becomes more important. Wing ditches should be installed at intervals as close as practical, but released only onto stable outlets. Constructing roads with long, uninterrupted grades on the steeper slopes should be avoided.

Woodland Management Group 17. This group includes the Betis, Darco, and Grapeland soils in map units BtC, DaC, DaE, and GrB. These sandy soils are on uplands. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, and hickory. The site index for loblolly pine averages 85 feet, but can range from 80 to 90 feet depending on slope and slope position. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 330 board feet per acre per year. Management can substantially increase this yield.

Generally, these soils are not very erosive. However, to minimize erosion associated with logging on the steeper slopes, care must be taken to prevent uphill and downhill rutting during skidding and hauling. Machine planting should be done on the contour on the steeper slopes. The coarse texture of these soils may restrict equipment use during dry periods. Modified equipment, such as tandem-axled, four-wheel drive, or wide-tired vehicles, may be needed. Seedling mortality may be significant due to the low available water capacity of these soils. Successful establishment of planted pine requires attention to proper planting depth and soil compaction. Planting when the soil is moist should be helpful. Control of competing herbaceous weeds, either during site preparation or as a release during the first growing season, may also be needed. Some replanting may be necessary, especially following a particularly dry year. As slopes increase, the need for proper road design and construction becomes more important. Constructing roads with long, uninterrupted grades should be avoided and water-control devices should be installed. Wing ditches should be installed at intervals as close as practical, but released only onto stable outlets.

Woodland Management Group 18. This group includes the Keltys, Kirvin, and Multey soils in map units KeB, KeD, KfC, and MxA. These loamy and clayey soils are on gently sloping uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, southern red oak, sweetgum, and hickory. The site index for loblolly pine averages 85

feet, but can range from 80 to 90 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 280 board feet per acre per year. Management can substantially increase this yield.

There are no significant management problems associated with these soils. However, as the slopes increase on Keltys soils, the potential for erosion also increases. Care should be taken to avoid rutting on such sites, and intensive site preparation should be restricted to the flatter slopes. Proper road design and layout that includes the use of water-control devices, such as water bars and wing ditches, on the steeper slopes should be used.

Woodland Management Group 19. The Fuller soils in map units FuA and FuB are in this group. These loamy soils are on uplands and may have a high water table during the winter and spring months. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, water oak, willow oak, cherrybark oak, blackgum, red maple, and sweetgum. The site index for loblolly pine averages 85 feet, but can range from 80 to 95 feet depending on slope and wetness. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 280 board feet per acre per year. The yield for sweetgum is approximately 165 board feet per acre per year. Management can substantially increase these yields.

Although erosion is generally not a concern, these soils can become erosive when drastically disturbed, particularly on the steeper slopes. Management operations should be planned to cause as little disturbance to the soil as possible and to avoid uphill and downhill rutting. A high water table may cause severe restrictions to access during the late winter and spring months and during wet periods. Modified equipment, such as tandem-axled and four-wheel drive vehicles, is necessary during these times. Care must be taken to prevent excessive rutting on the flatter slopes. The abundant available moisture and presence of salts in these soils may lead to significant pine seedling mortality. Therefore, site preparation should be limited to the extent needed for planting and should not remove all vegetation, tree planting should be planned to follow harvesting as soon as possible, and natural regeneration should be considered. Control of invading brush and undesirable species may be needed in regeneration operations. During road design and layout, attention should be given to avoid extremely flat or depressional areas and to not interrupt normal drainage. Crowning and raising the roadbed may be needed. Road maintenance is necessary to fill ruts and holes.

Woodland Management Group 20. This group includes the Cuthbert, Kirvin, and Trawick soils in map units CtE, CuE, KgC, TrE, TwC, and TwE. These loamy and gravelly soils are on rolling uplands. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, hickory, post oak, southern red oak, and white oak. The site index for loblolly pine averages 80 feet, but can range from 75 to 85 feet depending on the slope position. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 230 board feet per acre per year. Management can substantially increase this yield.

As slopes increase, the potential for erosion increases. Care should be taken to avoid uphill and downhill rutting during harvesting. Intensive site preparation should be restricted to the flatter slopes, and machine planting should be done on the contour. On steeper sites, less intensive site preparation and regeneration methods, such as roller-chopping, burning, or underplanting and deadening, should be considered. The clayey subsoil may restrict equipment use during wet periods. Modified equipment, such as four-wheel drive vehicles, may be needed. Since clay occurs within 10 inches of the surface, particular attention should be given to tree planting methods that ensure proper root placement and soil compaction. Subsoiling before machine planting on the flatter slopes may also improve seedling survival. Low soil strength, particularly when wet, may cause road problems. As slopes increase, the need for proper road design and construction, including the installation of water-control devices, such as water bars, dips, and wing ditches, becomes more important. Long, uninterrupted grades should be avoided. Sloughing of cuts and fills may also be a problem on steeper slopes. The surface should be left as flat as possible. Potential problem areas should be revegetated.

Woodland Management Group 21. This group includes the Annona, Herty, Kellison, Lacerda, and Woodtell soils in map units AnA, AnB, HeA, HeB, KcE, LaA, LaB, LaE, WoB, and WoE. These soils are on uplands. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, southern red oak,

cherrybark oak, white ash, green ash, and sweetgum. The site index for loblolly pine averages 80 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 230 board feet per acre per year. The yield for sweetgum is approximately 120 board feet per acre per year. Although management can substantially increase these yields, short rotation management systems may be considered because trees growing on these soils tend to have poor form.

As slopes increase, particularly on the Kellison, Lacerda, and Woodtell soils, the potential for erosion increases. Steps should be taken to avoid uphill and downhill rutting during harvesting. Intensive site preparation should be restricted to the flatter slopes, and machine planting should be done on the contour. On steeper sites, less intensive site preparation and regeneration methods, such as roller-chopping, burning, or underplanting and deadening, should be considered. The clayey subsoil may restrict equipment use during wet periods. Modified equipment, such as four-wheel drive vehicles, may be needed. Since clay occurs within 10 inches of the surface, particular attention should be given to tree planting methods that ensure proper root placement and soil compaction. Subsoiling before machine planting on the flatter slopes may also improve seedling survival. The high shrink-swell nature of these soils makes road construction and maintenance difficult. As slopes increase, the need for proper road design and construction, including the installation of water-control devices, such as water bars, dips, and wing ditches, becomes more important. Long, uninterrupted grades should be avoided. In addition, care must be taken to prevent excessive rutting, especially on the flatter slopes. Road maintenance is necessary to fill ruts, cracks, and holes. Sloughing of cuts and fills may also be a problem on steeper slopes. The surface should be left as flat as possible. Potential problem areas should be revegetated.

Woodland Management Group 22. This group includes the Cuthbert and Trawick soils in map units CtG and TxG. These soils are on steep uplands. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, hickory, post oak, southern red oak, and white oak. The site index for loblolly pine averages 80 feet, but can range from 75 to 85 depending on slope position. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 230 board feet per acre per year. Management can substantially increase this yield.

The steep slopes of these soils can cause severe equipment limitations and increase the potential for erosion. Harvesting methods need to be adjusted to limit the use of equipment as much as possible. Skidding should either be restricted to selected trails or done on as gentle an uphill grade as possible. Traffic should be excluded or restricted during wet periods. Site preparation and tree planting should be planned to cause a minimum of disturbance to the site. Underplanting or hand planting followed by release should be considered. Attention to planting methods is important to assure proper root placement and soil compaction. Because the slopes on these soils exceed the recommended maximum grade for roads, construction should be avoided whenever possible. If this is not possible, adequate water-control devices, such as water bars, dips, and wing ditches, must be installed. Care must be taken to ensure that these devices release only onto stable outlets. Seeding of the road surface may be necessary; however, seeding of ditches and outlets, as well as other problem and disturbed areas, should be planned.

Woodland Management Group 23. The Mollville soils in map units MoA and MpA are in this group. These loamy soils are on nearly level terraces and may also be in depressional areas. They may be saturated during the winter months. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, water oak, willow oak, sweetgum, and green ash. The site index for loblolly pine, water oak, and sweetgum averages 80 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 230 board feet per acre per year. The yield for sweetgum is approximately 120 board feet per acre per year. Management can substantially increase these yields.

Wetness during much of the year may greatly restrict the use of equipment. Harvesting should be planned during drier periods. Modified equipment, such as tandem-axled, wide-tired, or four-wheel drive vehicles, is needed most of the time. Care should be taken to prevent excessive rutting and the blockage of drainageways. Pine seedling mortality may be significant, especially during wet years. Planting during the drier part of the planting season should be planned. In addition, bedding or mounding may also be beneficial. Competition to desirable seedlings from herbaceous and woody plants may be severe. Site preparation and release practices that will control this

competition will be needed. Road construction should be planned to avoid these soils whenever possible. If road construction is necessary, crowning and raising the roadbed may be needed. Road maintenance should be planned, and care should be taken to prevent ponding.

Woodland Management Group 24. This group includes the Derly and Percilla soils in map units FsA and PnA. These soils are on stream terraces and upland depressional areas and may have a high water table during the late winter and spring months. They are best suited to the production of hardwood trees.

Common trees of the overstory are sweetgum, green ash, blackgum, willow oak, and cherrybark oak. The site index for sweetgum and bottomland oaks averages 80 feet. The yield from an unmanaged, natural stand of sweetgum over a 50-year period is approximately 120 board feet per acre per year. Management can increase this yield.

Wetness may restrict access for periods during the late winter and spring months. Modified equipment, such as tandem-axled and four-wheel drive vehicles, is needed for much of the year. Control of invading brush and undesirable species may be needed in regeneration operations. Road construction should be planned to avoid these soils.

Woodland Management Group 25. This group includes the Chireno and Etoile soils in map units ChA and EtB. These clayey soils are on uplands. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, water oak, southern red oak, and sweetgum. Thorny species, such as hawthorns, dominate the understory. The site index for loblolly pine and sweetgum averages 75 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 180 board feet per acre per year. The yield for sweetgum is approximately 85 board feet per acre per year. Although management can increase these yields, short rotation management systems may be considered because trees growing on these soils tend to have poor form. The clayey subsoil may restrict equipment use during wet periods. Modified equipment, such as four-wheel drive vehicles, may be needed. The clay may also cause problems in tree planting. Attention to planting methods is important to assure proper root placement and soil compaction. The high shrink-swell nature of these soils makes road construction and maintenance difficult. Long, uninterrupted grades should be avoided. In addition, care must be taken to prevent excessive rutting, especially on the flatter slopes. Road maintenance is necessary to fill ruts, cracks, and holes. Potential problem areas should be revegetated.

Woodland Management Group 26. The Garner soils in map unit GaA are in this group. These clayey soils are on stream terraces and may be wet during the late winter and spring months. They are suited to the production of both pine and hardwood trees. Some sites, however, may have a high pH, which will limit their suitability for pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, water oak, willow oak, post oak, southern red oak, green ash, and sweetgum. The site index for loblolly pine averages 75 feet, but can range from 70 to 90 feet. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 230 board feet per acre per year. The yield for sweetgum is approximately 120 board feet per acre per year. Although management can increase these yields, short rotation management systems may be considered because trees growing on these soils tend to have poor form. The clayey surface may restrict equipment use during wet periods. Modified equipment, such as four-wheel drive vehicles, may be needed. The clay texture may cause a high rate of seedling mortality and problems in tree planting. Attention to planting methods is important to assure proper root placement and soil compaction. Poor drainage may also cause severe pine seedling mortality. Care must be taken during harvesting and site preparation operations to prevent excessive rutting and maintain normal drainage. Tree planting should be done during the drier part of the season. Control of invading brush and undesirable species may be needed in regeneration operations. The shrink-swell nature of these soils makes road construction and maintenance difficult. During road design and layout, attention should be given to avoid extremely flat or depressional areas and to not interrupt normal drainage. Road maintenance is necessary to fill ruts, cracks, and holes.

Woodland Management Group 27. This group includes the Kaufman and Texark soils in map units Ka, Kb, Te, and Tf. These soils are on flood plains and may flood for very brief to long duration in the late winter and spring months. Therefore, they are best suited to the production of hardwood trees only.

Common trees of the overstory are green ash, hackberry, pecan, cottonwood, sycamore, and willow oak. The site index for bottomland oaks averages 70

feet. The yield from an unmanaged, natural stand of willow oak over a 50-year period is approximately 60 board feet per acre per year. Although management can increase this yield, it should also include attention to streamside management zone practices to protect water quality.

Wetness may restrict access for periods during the late winter and spring months. Modified equipment, such as tandem-axled and four-wheel drive vehicles, is needed for much of the year. Control of invading brush and undesirable species may be needed in regeneration operations. During road design and layout, attention should be given to avoid extremely flat areas and to not interrupt normal drainage. Crowning and raising the roadbed may be needed. Road maintenance is necessary to fill ruts and holes. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 28. This group includes the Eastham and Hallsbluff soils in map units EaA, EaB, and HbC. The high pH of these soils make them best suited to the production of hardwood trees only.

Common trees of the overstory are green ash, water oak, post oak, and hackberry. The site index for water oak averages 70 feet. The high shrink-swell property of these soils causes trees to have poor form and, therefore, makes management undesirable. The clayey surface may restrict equipment use during wet periods. Modified equipment, such as four-wheel drive vehicles, may be needed. Care must be taken during any harvesting operation to prevent excessive rutting and to maintain normal drainage. The shrink-swell nature of these soils makes road construction and maintenance difficult. During road design and layout, attention should be given to avoid extremely flat areas and to not interrupt normal drainage. Road maintenance is necessary to fill ruts, cracks, and holes.

Woodland Management Group 29. This group includes the Naclina and Bub soils in map units NaG and TxG. Although both of these soils are on steep uplands, the Bub soils are shallow and may have a stony surface. They are best suited to the production of pine trees, but hardwood trees usually dominate the Naclina soils.

Common trees of the overstory are loblolly pine, shortleaf pine, white ash, hickory, southern red oak, post oak, and white oak. The site index for loblolly pine averages 65 feet, but can range from 60 to 75 feet depending on slope and slope position. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 95 board feet per acre per year. Management can increase this yield.

The steep slopes of these soils and the shallow surface of the Bub soils may cause severe equipment limitations and increase the potential for erosion. Harvesting methods need to be adjusted to limit the use of equipment as much as possible. Skidding should either be restricted to selected trails or done on as gentle an uphill grade as possible. Traffic should be excluded or restricted during wet periods. Site preparation and tree planting should be done in ways that cause a minimum of disturbance to the site. Underplanting or hand planting followed by release should be considered. Attention to planting methods is important to assure proper root placement and soil compaction. The stony surface may restrict planting methods on the Bub soils to hand planting. Because the slopes on these soils exceed the recommended maximum grade for roads, construction should be avoided whenever possible. If this is not possible, adequate water-control devices, such as water bars, dips, and wing ditches, must be installed. Care must be taken to ensure that these devices release only onto stable outlets. Seeding of the road surface may be necessary, but seeding of ditches and outlets, as well as other problem and disturbed areas, should be planned.

Woodland Management Group 30. The Tonkawa soils in map unit ToC are in this group. These very deep sandy soils are on uplands. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, and hickory. The site index for loblolly pine averages 65 feet, but can vary depending on slope position in steeper areas. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 95 board feet per acre per year. Management can increase this yield.

The coarse texture of these soils causes a severe limitation on equipment use, particularly during dry periods. Modified equipment, such as tandem-axled, four-wheel drive, or wide-tired vehicles, is needed. Generally, erosion is not a severe problem, but it can be when runoff water is confined. Therefore, uphill and downhill rutting must be avoided. Site preparation should be kept to a minimum to maintain as much of the organic matter as possible on the soil surface. Site preparation burning should be avoided. To minimize the impact of site preparation and still achieve control of competing vegetation, the use of

herbicides for release should be considered. Control of herbaceous competition during the first growing season may be important to successful seedling establishment. Because these soils are droughty, seedling mortality should be expected to be high and replanting should be planned. Measures, such as planting in furrows plowed on the contour and root treatments with absorbents, may be helpful. These very deep sandy soils cause serious problems in road construction and maintenance. Where possible, permanent roads should be kept to a minimum and constant maintenance should be planned. During road construction, V-shaped ditches should be avoided and water-control devices must have stable outlets. Temporary roads should be retired after use by reshaping if necessary, revegetating, and restricting access.

Woodland Management Group 31. The Kirvin soils in map unit KhC are in this group. These soils are on uplands. The surface has been removed for gravel. These soils are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, southern red oak, and hickory. The site index for loblolly pine averages 65 feet, but can vary depending on the amount of site disturbance. The yield from an unmanaged, natural stand of loblolly pine over a 50-year period is approximately 95 board feet per acre per year. The lack of surface and the clayey texture of these soils cause all phases of management to have special concerns.

Stabilizing these soils against erosion is often needed because of sparse vegetation. Seeding may be needed. Since clay may occur at the surface, attention to tree planting methods is important. Subsoiling prior to planting may be required, and attention must be given to root placement and soil compaction. Harvesting methods that minimize soil disturbance should be planned. The use of equipment may be restricted during wet periods. Roads built on these soils must have adequate water-control devices, such as water bars, dips, and wing ditches, installed. Outlets must release only onto stable areas, and seeding of outlets and ditches may be necessary.

Woodland Understory Vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some woodland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Table 7 shows, for each soil suitable for woodland, the potential for producing understory vegetation. The total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4.5 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, soil moisture is above average during the optimum part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average.

The table also lists the common names of the characteristic vegetation on each soil and the *composition*, by percentage of air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

Recreation

Houston County, with its location, climate, topography, highways, and natural resources, has a high potential for numerous outdoor recreational activities. The county is about one and one-half hour drive from Houston and two and one-half hours drive from Dallas, which provides close proximity to population centers for activities requiring large numbers of people.

The county has many areas of scenic, geologic, and historical interests. These areas are used for camping, hiking, hunting, fishing, sightseeing, picnicking, and boating (fig. 12). Public areas available for recreation include the Davy Crockett National Forest, Mission Tejas State Park, Houston County Lake, Ratcliff Lake Park, Neches Bluff Overlook, Monroe Cook House, Downes-Aldrich House, and the World Championship Fiddlers Festival.

In table 8, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but

Figure 12.—Camping and other forms of recreation are popular in the forested areas of Houston County.

important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented

by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Robert M. Stellbauer, biologist, Natural Resources Conservation Service, helped prepare this section.

Soils are the foundation that supports populations of fish and wildlife in Houston County. Soils, along with climate, topography, and man’s influence, directly affect the quality and quantity of habitat available to fish and wildlife.

The Texas Parks and Wildlife Department has identified four major habitat types in Houston County: (1) water oak/elm/hackberry forests, (2) young forests/grasslands, (3) pine/hardwood forests, and (4) native/introduced grasses. In addition to these major habitat types, aquatic habitat exists as upland depressional wetlands and open water habitat, including Houston County Lake and numerous farm ponds and Trinity and Neches Rivers and their major and minor tributaries, such as San Pedro Creek, Big Creek, and White Rock Creek. Habitat associated with cropland occurs in the county in the Trinity River bottom as well as in the Grapeland area.

The *water oak/elm/hackberry forest* habitat type occurs in the flood plains and associated terraces of the rivers and other drainageways in the county. Characteristic soils of the flood plains are Kosse, Koury, Laneville, Pophers, and Nahatche. Associated plant species in the flood plains include overcup oak, water oak, willow oak, blackgum, red maple, black willow, palmetto, elderberry, Alabama supplejack, greenbrier, and trumpet creeper. Representative terrace soils include Annona, Attoyac, Bernaldo, Latex, and Mollville. Plant species associated with the terrace soils include loblolly pine, white oak, beech, hackberry, American elm, and water hickory and water locust in the wetter, depressional soils, such as Mollville.

These flood plain and terrace areas are some of the most productive wildlife lands in the county and provide habitat to migratory and resident waterfowl, white-tailed deer, eastern wild turkey, beaver, raccoon, mink, bobcat, gray and fox squirrels, woodpeckers, and songbirds. Alligators, water snakes, frogs, toads, turtles, and salamanders are also present in these areas.

Improvement practices applicable to this habitat type include selective thinning of hardwoods, hardwood reforestation where needed, creation of food plots, and installation of structures to create shallow water areas for waterfowl.

The *young forest/grassland* habitat type is not soil or site specific. This habitat type usually develops in the 7 to 10 years following the clearcutting and replanting of a forest. Plant species vary, but generally consists of loblolly pine, shortleaf pine, various oaks, sweetgum, and hickory. Shrubs, forbs, and grasses in this habitat type include sumac, sassafras, blackberry, greenbrier, hawthorn, yaupon, tickclover, lespedeza, ragweed, dog fennel,

broomsedge bluestem, pinehill bluestem, vaseygrass, and Florida paspalum. This habitat type provides food and cover for deer, coyote, turkey, cottontail rabbit, woodcock, songbirds, and small mammals. On sandy soils, such as Darco and Tonkawa, the abundance of annual forbs and perennial legumes and the lack of dense herbaceous cover offer the potential for production of bobwhite quail and mourning doves.

As this habitat type ages, practices that can help maintain or improve its quality are annual disking, creation of food plots, selective thinning, and proper grazing.

The *pine/hardwood forest* habitat type, as typified by the Davy Crockett National Forest, generally occurs on upland soils, such as Kirvin, Sacul, Woodtell, and Cuthbert, and is not specific to topography. Plant species associated with this habitat includes loblolly pine, shortleaf pine, sweetgum, yaupon, greenbrier, longleaf uniola, beaked panicum, lespedeza, and tickclover. This habitat type provides food and cover for white-tailed deer, turkey, fox squirrel, raccoon, opossum, bobcat, owls, hawks, woodpeckers, such as the endangered red cockaded woodpecker, and songbirds. While soils and topography may influence the types and amounts of vegetation present, the quality of this habitat is influenced most by the density of canopy in the overstory and midstory. As canopy cover increases, the diversity and quantity of understory plant species decrease.

Selective thinning, creating forest openings, planting supplemental food plots, prescribed burning, and proper woodland grazing are practices that can improve the quality of this habitat.

The *native/introduced grass* habitat type is normally found on loamy and sandy upland soils, such as Betis, Bienville, Bowie, and Lilbert; better drained bottomland terrace and flood plain soils, such as Annona, Attoyac, and Bernaldo; and native prairie soils, such as Eastham, Etoile, Lacerda, and Woodtell.

The native grass habitat is usually composed of grasses, forbs, shrubs, and vines. Little bluestem, broomsedge bluestem, switchgrass, indiangrass, partridge pea, tickclover, lespedeza, yankee-weed, giant ragweed, greenbrier, dewberry, and yaupon are common plant associates. This habitat type provides food and cover for turkey, quail, white-tailed deer, cottontail rabbit, coyote, meadowlark, and red-tailed hawk. The native grassland is very important as fawning habitat for deer and nesting habitat for wild turkey.

Introduced grass habitat is common in the county and usually consists of either bermudagrass or bahiagrass. These are commonly overseeded in the fall to cool-season annual grasses, such as ryegrass, and to cool-season legumes, such as white clover, crimson clover, or arrowleaf clover. These cool-season grasses and legumes provide supplemental foods for deer, turkey, rabbits, and geese.

Control of woody vegetation on native or introduced grasses through mowing, application of herbicides, or prescribed burning is essential for the maintenance of this habitat type. Annual disking, supplemental food plots, and controlled grazing are other practices that may be used to maintain or improve habitat quality.

The aquatic habitat of lakes, rivers, and creeks along with the many farm ponds occurring in the county provide habitat for largemouth bass; channel, blue, and yellow catfish; crappie; and bluegill sunfish. Beaver, blue and green herons, common and cattle egrets, wood ducks, scaup, and redhead ducks also use these aquatic habitats. Farm ponds in the county also provide aquatic habitat to upland wildlife species, waterfowl, fish, and reptiles. Soils suitable for farm pond construction include Kirvin, Sacul, and Woodtell. These ponds are usually stocked with largemouth bass, channel catfish, fathead minnows, and bluegill sunfish.

Farm ponds in Houston County may require the application of agricultural limestone to ensure good productivity. Other practices useful in maintaining or improving quality pond habitat include aquatic weed control, fertilization, proper fish stocking and harvesting, and the installation of siphon or trickle tubes.

Wildlife habitat associated with cropland occurs in the Trinity River bottom and Grapeland area. Waste grains and seeds from corn, grain sorghum, peanuts, and watermelons along with the associated forbs, such as croton, ragweed, and partridge pea, provide food for dove, quail, songbirds, and waterfowl. White-tailed deer and rabbits also find food and cover in the habitats associated with cropland. Annual cool-season forage crops, such as wheat, oats, and ryegrass, provide food for deer, rabbits, geese, and cranes.

Improvement practices applicable to habitat associated with cropland include retention of crop residue on the soil surface through the winter months; maintenance of forbs, grasses, and shrubs in fence lines and along turn rows; and providing unharvested rows of grain crops through the winter months.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also

affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bermudagrass, lovegrass, bahiagrass, fescue, singletary pea, clover, and vetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, panicum, indiangrass, longleaf uniola, and purpletop.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, sweetgum, hawthorn, dogwood, hickory, blackberry, and blueberry.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cattail, maidencane, rushes, and sedges.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and coyote.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodpeckers, squirrels, coyote, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, alligator, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are

structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. Depth to a high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance

of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a

plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment.

Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 19.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 19.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than

3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount

of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when

thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than a 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian*, or *apparent*; and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in

installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 17 and the results of chemical analysis in table 18. The data are for soils sampled at carefully selected sites. The pedons are typical of the series and are described in the section “Soil Series and Their Morphology.” Soil samples were analyzed by the National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska; and by the Soil Characterization Laboratory, Texas A&M University, College Station, Texas.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (USDA, 1984).

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).

Water retained—pressure extraction, percentage of ovendry weight of less than 2 mm material; 1/3 or 1/10 bar (4B1), 15 bars (4B2).

Bulk density—of less than 2 mm material, saran-coated clods field moist (4A1a), 1/3 bar (4A1d), ovendry (4A1h).

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).

Extractable cations—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2d), potassium (6Q2b).

Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1f).

Aluminum saturation (5G1).

Exchangeable sodium percentage (5D2).

Clay mineralogy (7A2i).

Engineering Index Test Data

Table 19 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section “Soil Series and Their Morphology.” The soil samples were tested by the Texas Department of Highways and Public Transportation Soil Laboratory, Austin, Texas.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); Moisture density—T 99 (AASHTO), D 698 (ASTM); Specific gravity—T 100 (AASHTO), D 854 (ASTM); California bearing ratio—T 193 (AASHTO), D 1883 (ASTM); and Shrinkage—T 92 (AASHTO), D 427 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, siliceous, thermic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (USDA, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA, 1975) and in “Keys to Soil Taxonomy” (USDA, 1992). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section “Detailed Soil Map Units.”

Alazan Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Loamy alluvium from river and stream deposits

Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, siliceous, thermic Aquic Glossudalfs

Typical Pedon

Alazan very fine sandy loam, in an area of Alazan very fine sandy loam, 0 to 2 percent slopes, in an area of woodland; from Texas Highway 7 at Ratcliff, 1 mile northwest on Farm Road 227, 2.5 miles northeast on county road, 2.9 miles northeast and southeast on intersecting county road, 1 mile east on intersecting county road, 100 feet south of road:

A—0 to 3 inches; dark grayish brown (10YR 4/2) very fine sandy loam; common brownish yellow (10YR 5/6) root stains; weak fine subangular blocky structure; slightly hard, friable; many fine and medium roots; strongly acid; clear smooth boundary.

E—3 to 9 inches; pale brown (10YR 6/3) very fine sandy loam; common medium distinct yellowish brown (10YR 5/8) iron accumulations; weak medium subangular blocky structure; slightly hard, friable; common fine, medium, and coarse roots; strongly acid; gradual wavy boundary.

Bt/E1—9 to 25 inches; brownish yellow (10YR 6/6) loam; common fine distinct light brownish gray (10YR 6/2) iron depletions; moderate medium subangular blocky structure; hard, friable; common medium roots; common fine pores; few patchy clay films; about 10 percent streaks and pockets of albic material (E); strongly acid; gradual wavy boundary.

Bt/E2—25 to 36 inches; brownish yellow (10YR 6/6) sandy clay loam; many medium distinct light brownish gray (10YR 6/2) iron depletions; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; few patchy clay films; about 20 percent streaks and pockets of albic material (E); strongly acid; gradual wavy boundary.

Bt/E3—36 to 60 inches; variegated yellowish brown (10YR 5/4), light yellowish brown (10YR 6/4), and light brownish gray (10YR 6/2) sandy clay loam; moderate medium subangular blocky structure; hard, firm; few fine roots; few fine pores; few patchy clay films; about 20 percent streaks and pockets of albic material (E); slightly acid; clear wavy boundary.

Bt/E4—60 to 71 inches; variegated yellowish red (5YR 5/8), yellowish red (5YR 5/6), brownish yellow (10YR 6/8), and light gray (10YR 7/1) sandy clay loam; weak medium subangular blocky structure; hard, friable; few fine roots; few clay films; about 5 percent streaks and pockets of albic material (E); slightly acid; gradual wavy boundary.

Bt/E5—71 to 80 inches; variegated yellowish red (5YR 4/6), light gray (10YR 7/1), and brownish yellow (10YR 6/8) sandy clay loam; weak medium subangular blocky structure; hard, friable; few clay films; about 5 percent streaks and pockets of albic material (E); slightly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 25 percent
Redoximorphic features: Iron accumulations in shades of red are in some pedons at more than 8 inches deep
Other distinctive soil features: Silt content is 28 to 45 percent in the particle-size control section
Concentrated minerals: None
Reaction: A and E horizons—very strongly acid to moderately acid; upper part of the Bt/E horizon—very strongly acid or strongly acid; lower part of the Bt/E horizon—very strongly acid to slightly acid

A horizon:
Color—gray, dark gray, dark grayish brown, grayish brown, or brown
Redoximorphic features—none
Texture—very fine sandy loam
Other features—none

E horizon:
Color—light gray, light brownish gray, pale brown, or very pale brown
Redoximorphic features—iron accumulations in shades of brown or yellow
Texture—very fine sandy loam or loam
Other features—none
Thickness—combined thickness of the A and E horizons ranges from 8 to 22 inches

Bt/E horizon:
Color—brown, yellowish brown, strong brown, light brown, light yellowish brown, brownish yellow, or reddish yellow (Bt, Bt matrix, E)
Redoximorphic features—yellowish red or red iron accumulations are in some pedons
Texture—loam or sandy clay loam
Other features—streaks and pockets of albic material (E) comprise from 5 to 40 percent with at least one layer comprised of at least 15 percent; in some pedons, 5 to 25 percent of the matrix is brittle (Bt)

Alto Series

Depth class: Deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Loamy and clayey residuum from marine sediments high in weathered glauconitic materials
Slope range: 1 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Hapludalfs

Typical Pedon

Alto fine sandy loam, in an area of Alto fine sandy loam, 1 to 3 percent slopes, in a pasture; from Texas Highway 19 in Grapeland, 9.5 miles east on Farm Road 227, 700 feet south along farm lane, 150 feet west of lane:

Ap—0 to 4 inches; brown (10YR 4/3) fine sandy loam; weak very fine subangular blocky structure; very friable, slightly hard; many fine and few medium roots; few very fine pores; 5 percent ironstone fragments; moderately acid; clear smooth boundary.

Bt1—4 to 16 inches; strong brown (7.5YR 5/6) sandy clay loam; common fine prominent brownish yellow (10YR 6/8) masses of iron accumulation; moderate very fine subangular blocky structure; hard, friable; many fine and common medium roots; common fine and few medium pores; few patchy clay films; about 8 percent ironstone fragments; slightly acid; clear smooth boundary.

Bt2—16 to 25 inches; strong brown (7.5YR 5/8) sandy clay loam; many medium distinct brownish yellow (10YR 6/8) and prominent dark red (2.5YR 3/6) masses of iron accumulation; moderate very fine subangular blocky structure; hard, friable; many fine and common medium roots; common fine and medium pores; common patchy clay films; 10 percent ironstone fragments; slightly acid; gradual smooth boundary.

Bt3—25 to 32 inches; yellowish brown (10YR 5/4) clay loam; many medium prominent dark red (2.5YR 3/6) and distinct brownish yellow (10YR 6/8) masses of iron accumulation; weak very fine subangular blocky structure; hard, friable; common fine and medium roots; common fine and medium pores; common clay films; 14 percent ironstone fragments; slightly acid; gradual smooth boundary.

Bt4—32 to 40 inches; yellowish brown (10YR 5/4) clay; many medium distinct brownish yellow (10YR 6/8) and many fine prominent dark red (2.5YR 3/6) redoximorphic concentrations; weak very fine subangular blocky structure; hard, firm; few fine and medium roots; few fine pores; common clay films; 10 percent ironstone fragments; slightly acid; gradual smooth boundary.

Bt5—40 to 48 inches; dark yellowish brown (10YR 4/4) gravelly clay; many medium distinct brownish yellow (10YR 6/8) and many fine prominent dark red (2.5YR 3/6) redoximorphic concentrations; moderate very fine subangular blocky structure; hard, firm; few fine roots; few fine pores; common clay films; 30 percent ironstone fragments; slightly acid; gradual smooth boundary.

Bt6—48 to 56 inches; dark yellowish brown (10YR 4/4) very gravelly clay; common medium distinct brownish yellow (10YR 6/8) and prominent dark red (2.5YR 4/6) redoximorphic concentrations; moderate very fine subangular blocky structure; very hard, firm; few fine roots; few fine pores; common clay films; about 50 percent ironstone fragments; moderately acid; gradual smooth boundary.

C/Bt—56 to 65 inches; yellowish brown (10YR 5/8) clay and weathered glauconitic material with texture of loam to clay; about 10 percent red (2.5YR 4/8) pockets of silty clay (Bt); moderate very fine subangular blocky structure; very hard, firm; few fine roots in cracks along ped faces; common distinct clay films; 12 percent ironstone fragments; neutral; clear wavy boundary.

C—65 to 80 inches; variegated strong brown (7.5YR 4/6), yellowish brown (10YR 5/8), and light olive brown (2.5Y 5/4) stratified weathered glauconitic material with texture of loam; massive; very hard, firm; few fine roots; 10 percent ironstone fragments; 7 to 8 percent pseudomorphic fossils; few thin discontinuous layers of calcium carbonate; neutral.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 25 to 35 percent
Redoximorphic features: Iron depletions in shades of gray at more than 30 inches deep
Other distinctive soil features: Clay content decreases by 20 percent of the maximum at less than 60 inches deep
Concentrated minerals: None
Reaction: A or Ap horizon—moderately acid to neutral; upper part of the Bt horizon—strongly acid to slightly acid; lower part of the Bt horizon—strongly

acid to neutral; C horizon—moderately acid to neutral, with or without spots that are slightly alkaline

A or Ap horizon:

Color—dusky red, dark reddish brown, reddish brown, dark reddish gray, very dark grayish brown, dark brown, dark yellowish brown, dark grayish brown, or brown

Redoximorphic features—none

Texture—fine sandy loam

Other features—none

Bt horizon:

Color—reddish brown, yellowish red, brown, dark brown, strong brown, dark yellowish brown, or yellowish brown

Redoximorphic features—redoximorphic concentrations in shades of brown, red, and yellow are few or common throughout; iron depletions in shades of gray range from few to many below a depth of 30 inches

Texture—loam, sandy clay loam, or clay loam in the upper part; loam, sandy clay loam, clay loam, gravelly clay loam, gravelly clay, and very gravelly clay in the lower part

Other features—fragments of yellowish weathered glauconitic materials range from few to many below a depth of 30 inches

C horizon:

Color—strong brown, yellowish brown, light olive brown, or dark yellowish brown

Redoximorphic features—none

Texture—stratified fine sandy loam to clay and weathered glauconitic material

Other features—none

Annona Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Clayey, marine, and fluvial sediments from Pleistocene age marine, river, and stream deposits
Slope range: 0 to 3 percent
Taxonomic class: Fine, smectitic, thermic Vertic Paleudalfs

Typical Pedon

Annona loam, in an area of Annona loam, 1 to 3 percent slopes, in a pasture; from the intersection of Texas Highway 21 in Austonio, 4.2 miles northwest on Farm Road 1280 to Henderson Creek, 0.2 mile north-northwest on county road, 1.2 miles north on oil field road, 75 feet west of road:

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; slightly hard, very friable; common fine and medium roots; slightly acid; clear wavy boundary.

E—4 to 10 inches; brown (10YR 5/3) loam; few fine faint strong brown (7.5YR 5/6) redoximorphic concentrations and light brownish gray (10YR 6/2) iron depletions; weak fine subangular blocky structure; slightly hard, very friable; common fine and medium roots; moderately acid; clear smooth boundary.

Bt—10 to 16 inches; dark red (2.5YR 3/6) clay; few fine prominent pale brown (10YR 6/3) relict iron depletions; moderate medium subangular blocky structure; very hard, very firm; few fine roots; few pressure faces; few patchy clay films; very strongly acid; gradual wavy boundary.

Btss1—16 to 27 inches; dark red (2.5YR 3/6) clay; many medium distinct light brownish gray (10YR 6/2) relict iron depletions; moderate medium subangular blocky structure; extremely hard, very firm; few fine roots; few slickensides; common clay films; cracks between a few peds contain clean sand coating less than 3 millimeters thick; strongly acid; gradual wavy boundary.

Btss2—27 to 38 inches; variegated gray (10YR 6/1), dark reddish brown (2.5YR 3/4), and yellowish brown (10YR 5/6) clay; moderate medium angular blocky structure; extremely hard, very firm; few fine roots between ped faces; few slickensides; common clay films; cracks between a few peds contain clean sand coating less than 3 millimeters thick; strongly acid; gradual wavy boundary.

Btss3—38 to 52 inches; variegated light brownish gray (10YR 6/2), brown (10YR 4/3), and brownish yellow (10YR 6/6) clay; moderate medium angular blocky structure; extremely hard, very firm; few fine roots between peds; few slickensides; few clay films; few pitted calcium carbonate concretions; few iron concretions; neutral; gradual wavy boundary.

Btss4—52 to 63 inches; brownish yellow (10YR 6/8) clay; few streaks of very dark brown material; moderate medium angular blocky structure; extremely hard, very firm; few fine roots between peds; few slickensides; continuous clay films; few pitted calcium carbonate concretions; moderately alkaline; gradual wavy boundary.

Btss5—63 to 82 inches; brownish yellow (10YR 6/8) clay loam; few fine distinct light gray (10YR 7/1) relict iron depletions; moderate medium angular blocky structure; extremely hard, very firm; few fine roots; few slickensides; few fine pitted calcium carbonate concretions; moderately alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 40 to 60 percent
Redoximorphic features: Relict iron depletions in shades of gray or brown
Other distinctive soil features: Deep and wide cracks that extend to depths of 20 inches below the surface form during the dry months in most years
Concentrated minerals: Calcium carbonate concretions
Reaction: A or Ap and E horizons—strongly acid to slightly acid; Bt and upper part of the Btss horizon—very strongly acid or strongly acid; lower part of the Btss horizon—moderately acid to moderately alkaline

A or Ap horizon:
Color—brown, dark brown, dark grayish brown, or grayish brown
Redoximorphic features—none
Texture—loam
Other features—none

E horizon:
Color—pale brown or very pale brown
Redoximorphic features—redoximorphic concentrations in shades of brown and iron depletions in shades of gray
Texture—loam
Other features—none

Bt and upper part of the Btss horizon:
Color—red, dark red, or yellowish red
Redoximorphic features—light gray, light brownish gray, or pale brown iron depletions
Texture—clay loam or clay
Other features—none to few slickensides or pressure faces

Lower part of the Btss horizon:
Color—variegated in shades of brown, gray, red, and yellow
Redoximorphic features—light gray, light brownish gray, or pale brown iron depletions
Texture—clay loam or clay
Other features—Few or common slickensides

Attoyac Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Loamy alluvium from river and stream deposits
Slope range: 1 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Paleudalfs

Typical Pedon

Attoyac fine sandy loam, in an area of Attoyac fine sandy loam, 1 to 3 percent slopes, in an area of hayland; from Texas Highway 7 at Ratcliff, 1 mile northwest on county road, 2.9 miles northeast then southeast on intersecting county road, 0.15 mile northwest on timber lane, 600 feet north of farm gate:

Ap—0 to 6 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; soft, very friable; common fine roots; common fine pores; moderately acid; clear smooth boundary.

A—6 to 16 inches; brown (7.5YR 5/4) fine sandy loam; weak fine granular structure; soft, very friable; common fine roots; common fine pores; moderately acid; clear wavy boundary.

Bt1—16 to 30 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; common thin clay films; moderately acid; gradual wavy boundary.

Bt2—30 to 35 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct red (10R 4/8) lithochromic mottles; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; common thin clay films; moderately acid; gradual wavy boundary.

Bt3—35 to 43 inches; yellowish red (5YR 5/8) sandy clay loam; many medium distinct red (10R 4/8) lithochromic mottles; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; common thin clay films; moderately acid; gradual wavy boundary.

Bt4—43 to 56 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct red (10R 4/8) and brownish yellow (10YR 6/6) lithochromic mottles; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; few thin patchy clay films; strongly acid; gradual wavy boundary.

Bt5—56 to 80 inches; variegated red (10R 4/8) and brownish yellow (10YR 6/6) sandy clay loam; common medium distinct light brownish gray (10YR 6/2) lithochromic mottles; hard, friable; few fine roots; few clay films; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 25 percent
Redoximorphic features: Iron depletions in shades of gray range from none to common at more than 50 inches deep
Other distinctive soil features: Rounded ironstone and siliceous pebbles make up 0 to 5 percent of the soil; silt content in the particle-size control section is more than 20 percent
Concentrated minerals: None
Reaction: Strongly acid or moderately acid throughout

A or Ap horizon:
Color—reddish brown, yellowish red, brown, strong brown, yellowish brown, or dark brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

BA horizon (where present):
Color—red or dark red
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

Upper part of the Bt horizon:
Color—yellowish red, red, or dark red
Redoximorphic features—none
Texture—fine sandy loam, loam, or sandy clay loam
Other features—none

Lower part of the Bt horizon:
Color—red, dark red, yellowish red, or strong brown
Redoximorphic features—none
Texture—loam or sandy clay loam
Other features—skeletans, streaks, or pockets of clean sand range from none to less than 5 percent, by volume

Austonio Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Loamy alluvium from river and stream deposits
Slope range: 1 to 15 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Hapludalfs

Figure 13.—Profile of Austonio fine sandy loam.

Typical Pedon

Austonio fine sandy loam, in an area of Austonio fine sandy loam, 1 to 3 percent slopes (fig. 13), in a pasture; about 6.3 miles southwest of Austonio on Texas Highway 21 to a gate on the south side of 7-J Stock Farm headquarters, 1.7 miles west along farm lane, 0.3 mile northwest of lane:

Ap—0 to 3 inches; dark brown (10YR 4/3) fine sandy loam; weak very fine subangular blocky structure; slightly hard, very friable; many fine and few medium roots; few fine pores; slightly acid; clear smooth boundary.

A—3 to 12 inches; brown (10YR 5/3) fine sandy loam; weak fine subangular blocky structure; slightly hard, very friable; many fine and few medium roots; few fine pores; moderately acid; clear smooth boundary.

E—12 to 19 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; slightly hard, very friable; common fine and few medium roots; few fine pores; moderately acid; clear smooth boundary.

Bt1—19 to 28 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine prominent red (2.5YR 5/8) masses of iron accumulation; weak coarse prismatic structure parting to moderate fine subangular blocky; very hard, friable; common fine and few medium roots; few fine pores; common clay films on surface of prisms; slightly acid; gradual smooth boundary.

Bt2—28 to 42 inches; yellowish brown (10YR 5/8) sandy clay loam; common fine prominent red (2.5YR 5/8) masses of iron accumulation; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; very hard, friable; few fine roots; common fine pores; common clay films on surface of prisms; slightly acid; gradual smooth boundary.

BCt1—42 to 59 inches; brownish yellow (10YR 6/8) fine sandy loam; few fine faint light yellowish brown (10YR 6/4) masses of iron accumulation; weak coarse prismatic structure parting to moderate fine subangular blocky; very hard, friable; few fine roots; few fine pores; common clay films on surface of prisms; strongly acid; gradual smooth boundary.

BCt2—59 to 68 inches; brownish yellow (10YR 6/6) fine sandy loam; weak coarse prismatic structure parting to weak fine subangular blocky; very hard, friable; few fine roots; few fine pores; common clay films on surface of prisms; few iron-manganese concretions and stains; strongly acid; clear smooth boundary.

2C—68 to 80 inches; light yellowish brown (10YR 6/4) loamy fine sand; few fine distinct brownish yellow (10YR 6/6) masses of iron accumulation; single grained; soft, very friable; few fine roots; moderately acid.

Range in Characteristics

Solum thickness: 60 to 80 inches
Clay content in the control section: 18 to 30 percent
Redoximorphic features: None
Other distinctive soil features: Rounded siliceous or ironstone pebbles range from none to few; clay content decreases by 20 percent or more from the maximum at 40 to 60 inches deep
Concentrated minerals: None
Reaction: A or Ap horizon—strongly acid to slightly acid; E horizon—very strongly acid to slightly acid; Bt horizon—very strongly acid to moderately acid; BCt and 2C horizons—very strongly acid to slightly acid

A or Ap horizon:
Color—brown, dark brown, strong brown, yellowish brown, and dark yellowish brown; dark colored surface layers are less than 7 inches thick
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

E horizon:
Color—brown, pinkish gray, light brown, grayish brown, yellowish brown, light brownish gray, pale brown, or light yellowish brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

Upper part of the Bt horizon:
Color—brown, strong brown, brownish yellow, yellowish brown, dark yellowish brown, or reddish yellow
Redoximorphic features—none
Texture—loam or sandy clay loam
Other features—iron accumulations in shades of red, brown, or yellow range from few to many

Lower part of the Bt horizon:
Color—strong brown, reddish yellow, dark yellowish brown, yellowish brown, yellowish red, or brownish yellow
Redoximorphic features—none
Texture—loam or sandy clay loam
Other features—iron accumulations in shades of red, brown, or yellow range from few to many; or the matrix is variegated in these colors

BCt horizon:
Color—shades of red, yellow, or brown
Redoximorphic features—none
Texture—fine sandy loam or loam
Other features—some pedons have a few streaks or spots of uncoated sand grains

2C horizon:
Color—shades of yellow or brown
Redoximorphic features—none
Texture—fine sandy loam or loamy fine sand
Other features—some pedons have a few streaks or spots of uncoated sand grains

Bernaldo Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Loamy alluvium from river and stream deposits
Slope range: 0 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Glossic Paleudalfs

Typical Pedon

Bernaldo fine sandy loam, in an area of Bernaldo fine sandy loam, 1 to 3 percent slopes, in an area of woodland; from Loop 304 in Crockett, about 23 miles east of Crockett on Texas Highway 21 to the intersection of U.S. Forest Service Road 511, 2 miles south of Texas Highway 21 on U.S. Forest Service Road 511, 100 feet east of road:

A—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; soft, very friable; common fine roots; moderately acid; clear smooth boundary.
E—5 to 15 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine roots; moderately acid; clear wavy boundary.
Bt1—15 to 30 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; hard, friable; few fine roots; common fine pores; few patchy clay films; few albic material coatings on ped faces; few iron-manganese concretions; moderately acid; gradual wavy boundary.
Bt2—30 to 49 inches; yellowish brown (10YR 5/6) sandy clay loam; many coarse prominent dark red (10R 3/6) redoximorphic concentrations; moderate medium subangular blocky structure; hard, friable; few fine roots; few fine pores; few patchy clay films; few albic material coatings on ped faces; very strongly acid; gradual wavy boundary.
Bt/E1—49 to 78 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium prominent red (2.5YR 4/8) redoximorphic concentrations; weak medium subangular blocky structure; hard, friable; few fine roots; few fine pores; common clay films; about 5 to 10 percent albic material (E) on vertical ped faces; about 10 percent brittleness; very strongly acid; gradual wavy boundary.
Bt/E2—78 to 84 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium prominent red (2.5YR 4/8) redoximorphic concentrations; weak medium subangular blocky structure; hard, friable; few fine roots; few fine pores; common clay films; about 5 to 10 percent albic material (E) on vertical ped faces; about 10 percent brittleness; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 30 percent
Redoximorphic features: Iron depletions with chroma of 2 or less at more than 30 inches deep
Other distinctive soil features: Silt content in the particle-size control section is about 20 to 45 percent
Concentrated minerals: None
Reaction: A, E, and EB or BE (where present) horizons—strongly acid to slightly acid; Bt and Bt/E horizons—very strongly acid to slightly acid

A horizon:
Color—dark brown, very dark grayish brown, dark grayish brown, grayish brown, or brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

E horizon:
Color—brown, grayish brown, light brownish gray, pale brown, or very pale brown
Redoximorphic features—none
Texture—fine sandy loam, very fine sandy loam, or loam
Other features—none

EB or BE horizon (where present):
Color—pale brown, very pale brown, yellowish brown, or brown
Redoximorphic features—none

Texture—fine sandy loam, very fine sandy loam, or loam
Other features—none

Bt horizon:
Color—reddish brown, light reddish brown, strong brown, brownish yellow, or yellow
Redoximorphic features—redoximorphic concentrations in shades of brown and red are in most pedons and range from few to many; iron depletions with chroma of 2 or less are below a depth of 30 inches
Texture—loam, sandy clay loam, or clay loam
Other features—none

Bt/E horizon:
Color—reddish brown, light reddish brown, strong brown, brownish yellow, or yellow (Bt); shades of gray, brown, or light brown (E)
Redoximorphic features—few to many iron depletions in shades of gray and redoximorphic concentrations in shades of brown or red; or the matrix is variegated in these colors
Texture—fine sandy loam, loam, or sandy clay loam
Other features—vertical streaks, pockets, or coatings on the surface of peds make up 5 to 15 percent (E); in some pedons, up to 15 percent of the mass is brittle

Besner Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Loamy, wind-reworked alluvium from river and stream deposits
Slope range: 0 to 2 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Typic Glossudalfs

Typical Pedon

Besner fine sandy loam, in an area of Besner fine sandy loam, 0 to 2 percent slopes, in an area of woodland; from Loop 304 in Crockett, about 23 miles east on Texas Highway 21, about 7 miles south on U.S. Forest Service Road 511, 2.5 miles northeast on U.S. Forest Service Road 517, 100 feet south of road:

A—0 to 10 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; soft, loose; many fine and medium roots; moderately acid; gradual wavy boundary.
E—10 to 18 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; slightly hard, very friable; common medium and coarse roots; slightly acid; gradual wavy boundary.
Bt—18 to 30 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; slightly hard, friable; common fine and medium roots; few thin clay films; few peds coated with albic material; strongly acid; clear wavy boundary.
Bt/E1—30 to 38 inches; strong brown (7.5YR 5/6) loam; common medium distinct yellowish red (5YR 4/6) masses of iron accumulation; weak medium subangular blocky structure; slightly hard, friable; few fine roots; few thin clay films; about 10 percent streaks and pockets of albic material (E); about 10 percent brittleness; strongly acid; gradual wavy boundary.
Bt/E2—38 to 49 inches; reddish yellow (7.5YR 6/6) loam; weak moderate subangular blocky structure; slightly hard, friable; few fine roots; few thin clay films; about 10 percent streaks and pockets of albic material (E); slightly acid; gradual wavy boundary.
Bt/E3—49 to 65 inches; strong brown (7.5YR 4/6) loam; weak moderate subangular blocky structure; slightly hard, friable; few fine roots; few thin clay films; about 10 percent streaks and pockets of albic material (E); slightly acid; gradual wavy boundary.
Bt/E4—65 to 80 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; loose, very friable; few fine roots; few thin clay films; about 5 percent streaks and pockets of albic material (E); slightly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 14 to 18 percent
Redoximorphic features: Yellowish red or red masses of iron accumulation in the lower part of the solum
Other distinctive soil features: None
Concentrated minerals: None
Reaction: Very strongly acid to slightly acid throughout

A horizon:
Color—brown or dark grayish brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

E horizon:

Color—pale brown, grayish brown, light brownish gray, light gray, very pale brown, brown, or light yellowish brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

Bt horizon:

Color—strong brown, brownish yellow, or yellowish brown
Redoximorphic features—none
Texture—fine sandy loam or loam
Other features—none

Bt/E horizon:

Color—strong brown, reddish yellow, yellowish brown, light yellowish brown, dark brown, dark yellowish brown, brown, or brownish yellow (Bt); shades of gray, brown, or light brown (E)
Redoximorphic features—yellowish red or red masses of iron accumulation
Texture—fine sandy loam, loam, or sandy clay loam
Other features—streaks and pockets of albic material (E) make up 5 to 35 percent; one layer at least 20 inches thick with 15 percent or more albic material; about 5 to 10 percent brittle bodies
Thickness—more than 20 inches

Betis Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landscape: Coastal plain
Landform: Uplands
Parent material: Sandy marine sediments
Slope range: 1 to 5 percent
Taxonomic class: Sandy, siliceous, thermic Psammentic Paleudults

Typical Pedon

Betis loamy fine sand, in an area of Betis loamy fine sand, 1 to 5 percent slopes, in a pasture; from Grapeland, 2 miles west on Farm Road 227, 0.5 mile south of road:

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak fine granular structure; soft, very friable; many medium and coarse roots; strongly acid; gradual smooth boundary.

E—10 to 40 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; loose; many medium and few coarse roots; moderately acid; gradual smooth boundary.

B/E—40 to 49 inches; yellowish brown (10YR 5/6) loamy fine sand; single grained; loose; common medium roots; common streaks and pockets of clean sand (E); moderately acid; gradual smooth boundary.

E and Bt1—49 to 61 inches; very pale brown (10YR 7/4) loamy fine sand that contains light brown (7.5YR 6/4) lamellae of fine sandy loam (Bt) $^1/_4$ to $^3/_4$ inch thick; single grained; loose; lamellae are massive; soft, very friable; common fine roots; lamellae have coated sand grains and some clay bridging; moderately acid; gradual wavy boundary.

E and Bt2—61 to 83 inches; very pale brown (10YR 7/3) loamy fine sand that contains strong brown (7.5YR 5/6) lamellae of fine sandy loam material (Bt) less than $^1/_4$ inch thick; single grained; loose; lamellae massive; soft, very friable; common fine roots; lamellae have coated sand grains and some clay bridging; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 2 to 10 percent
Redoximorphic features: None
Other distinctive soil features: Dry in some parts of the moisture control section for 75 to 90 cumulative days in most years
Concentrated minerals: None
Reaction: Very strongly acid to moderately acid throughout

A or Ap horizon:

Color—dark grayish brown, grayish brown, brown, or dark yellowish brown
Redoximorphic features—none
Texture—loamy fine sand
Other features—none

E horizon:

Color—grayish brown, brown, or yellowish brown
Redoximorphic features—none
Texture—fine sand or loamy fine sand
Other features—none

B/E horizon and Bw horizon (where present):

Color—Strong brown, yellowish brown, and yellowish red
Redoximorphic features—none
Texture—fine sand or loamy fine sand
Other features—randomly distributed streaks and pockets of clean sand are few or common

E and Bt horizon:
Color—brown, pale brown, very pale brown, light yellowish brown, or yellowish brown (E); yellowish red, strong brown, or yellowish brown (Bt)
Redoximorphic features—none
Texture—fine sand or loamy fine sand (E); loamy fine sand or fine sandy loam (Bt)
Other features—lamellae with a composite thickness more than 6 inches within a depth of 80 inches (E); some pedons have a continuous loamy fine sand Bt horizon as opposed to lamellae

Bt horizon (where present):
Color—yellowish red, strong brown, or yellowish brown
Redoximorphic features—none
Texture—loamy fine sand or fine sandy loam
Other features—none

Bowie Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Loamy marine sediments
Slope range: 1 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Plinthic Paleudults

Typical Pedon

Bowie fine sandy loam, in an area of Bowie fine sandy loam, 1 to 3 percent slopes, in an area of woodland; from Crockett Loop 304, 16 miles northwest on Texas Highway 21, 1.5 miles east on U.S. Forest Service Road 524, 0.9 mile east on U.S. Forest Service Road 526, 3 miles southeast on logging road, 300 feet south of road:

A—0 to 6 inches; brown (10YR 5/3) fine sandy loam; weak fine and medium granular structure; loose, very friable; many fine and medium roots; moderately acid; clear smooth boundary.

E—6 to 13 inches; very pale brown (10YR 7/4) fine sandy loam; weak medium and coarse subangular blocky structure; loose, very friable; common fine and medium roots; moderately acid; clear smooth boundary.

Bt1—13 to 29 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine distinct yellowish red (5YR 5/6) redoximorphic concentrations; moderate medium subangular blocky structure; hard, friable; common fine and medium roots; few pores; few thin clay films; strongly acid; clear wavy boundary.

Bt2—29 to 38 inches; brownish yellow (10YR 6/6) sandy clay loam; few fine distinct red (2.5YR 5/6) and faint strong brown (7.5YR 5/8) redoximorphic concentrations; moderate medium subangular blocky structure; hard, friable; few fine and medium roots; few fine pores; few thin clay films; 3 percent ironstone; 2 percent iron-manganese concretions; strongly acid; gradual wavy boundary.

Btv1—38 to 52 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct red (2.5YR 4/6) redoximorphic concentrations and distinct light brownish gray (10YR 6/2) iron depletions; weak medium subangular blocky structure; hard, friable; common fine roots; common fine pores; red redoximorphic concentrations or plinthite makes up about 10 percent of mass; about 5 percent brittle bodies; few clay films; 5 percent ironstone; strongly acid; gradual wavy boundary.

Btv2—52 to 72 inches; brownish yellow (10YR 5/8) sandy clay loam; many medium prominent red (2.5YR 4/8) and common yellowish red (5YR 5/6) redoximorphic concentrations; few fine distinct light gray (10YR 6/1) iron depletions; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; plinthite makes up about 10 to 15 percent of mass; 5 percent brittle bodies; few clay films; very strongly acid; gradual wavy boundary.

BC—72 to 93 inches; variegated brownish yellow (10YR 6/8), dark reddish brown (2.5YR 3/4), and light gray (10YR 7/1) sandy clay loam; moderate medium subangular blocky structure; very hard, firm; few fine roots; common fine pores; plinthite makes up about 5 percent of mass; 2 to 3 percent ironstone pebbles; about 15 percent brittle masses; about 10 percent albic material (E); few clay films; strongly acid; gradual wavy boundary.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 30 percent
Redoximorphic features: Redoximorphic concentrations in shades of red or yellow; iron or clay depletions in shades of gray at 25 to 60 inches deep
Other distinctive soil features: Dry in some parts of the moisture control section for 75 to 90 days in most years; silt plus very fine sand content in the

particle-size control section ranges from 30 to 60 percent

Concentrated minerals: Layers with 5 percent or more plinthite segregations, by volume, are at 25 to 60 inches deep

Reaction: A, E, and EB (where present) horizons—very strongly acid to slightly acid, unless limed; Bt, Btv, and BC horizons—very strongly acid or strongly acid

A horizon:

Color—very dark grayish brown, dark grayish brown, grayish brown, dark brown, brown, dark yellowish brown, or yellowish brown; dark colored surface layers are less than 7 inches thick

Redoximorphic features—none

Texture—fine sandy loam

Other features—none

E horizon:

Color—dark brown, brown, pale brown, dark yellowish brown, yellowish brown, light brown, or light yellowish brown

Redoximorphic features—none

Texture—very fine sandy loam or fine sandy loam

Other features—none

EB horizon (where present):

Color—brownish yellow, yellowish brown, or strong brown

Redoximorphic features—none

Texture—very fine sandy loam or fine sandy loam

Other features—none

Bt horizon:

Color—dark brown, brown, light brown, dark yellowish brown, light yellowish brown, yellowish brown, brownish yellow, strong brown, or reddish yellow

Redoximorphic features—reddish, brownish, or yellowish redoximorphic concentrations range from none to many

Texture—fine sandy loam, loam, sandy clay loam, or clay loam

Other features—none

Btv horizon:

Color—brown, strong brown, light brown, reddish yellow, yellowish brown, light yellowish brown, or brownish yellow

Redoximorphic features—few to many iron or clay depletions in shades of gray and redoximorphic concentrations in shades of red or yellow; or the matrix is variegated in these colors

Texture—fine sandy loam, sandy clay loam, or clay loam

Other features—grayish streaks and pockets of albic material make up 0 to 4 percent, by volume; plinthite, mainly in nodular form, makes up 5 to about 15 percent, by volume

BC horizon:

Color—brown, strong brown, light brown, reddish yellow, brownish yellow, yellowish brown, or light yellowish brown

Redoximorphic features—redoximorphic concentrations in shades of yellow or red; or the matrix is variegated or stratified in these colors

Texture—sandy clay loam, clay loam, or sandy clay; some pedons have strata of fine sandy loam or clay

Other features—some pedons have 5 to 20 percent, by volume, lenses or interfingers of uncoated sand grains; plinthite ranges from none to 4 percent, by volume

Bub Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from weathered glauconite and glauconitic marl
Slope range: 15 to 40 percent
Taxonomic class: Clayey, mixed, thermic, shallow Typic Hapludalfs

Typical Pedon

Bub fine sandy loam, in an area of Trawick-Bub complex, 15 to 40 percent slopes, in an area of woodland; from Crockett Loop 304 and Texas Highway 21, about 22 miles east on Texas Highway 21 to county road in Weches, 0.4 mile north on county road, 500 feet west on adjoining county road, 150 feet south of road:

A—0 to 6 inches; dark reddish brown (5YR 3/4) fine sandy loam; moderate fine granular structure; hard, friable; common very fine and fine roots; about 3 percent ironstone pebble fragments; slightly acid; clear smooth boundary.

Bt1—6 to 10 inches; red (2.5YR 4/6) clay; common medium prominent strong brown (7.5YR 4/6) lithochromic mottles; moderate fine subangular

blocky structure; very hard, very firm; common fine roots; few clay films; about 2 to 5 percent ironstone fragments; slightly acid; clear wavy boundary.

Bt2—10 to 15 inches; strong brown (7.5YR 5/6) clay; many medium prominent red (2.5YR 4/6) lithochromic mottles; moderate medium subangular blocky structure; very hard, very firm; common fine roots; common clay films; about 5 to 15 percent ironstone fragments; strongly acid; gradual wavy boundary.

Bt3—15 to 19 inches; strong brown (7.5YR 5/8) clay; common medium prominent red (2.5YR 4/6) lithochromic mottles; moderate medium subangular blocky structure; very hard, very firm; few ironstone fragments; few fine roots; few clay films; strongly acid; gradual wavy boundary.

Cr—19 to 50 inches; alternate layers of yellowish red (5YR 5/8), strong brown (7.5YR 5/8), and light gray (10YR 7/2) weathered glauconite and glauconitic marl; massive; very hard, very firm; moderately acid.

Range in Characteristics

Solum thickness: 12 to 20 inches
Clay content in the control section: 40 to 55 percent
Redoximorphic features: None
Other distinctive soil features: Content of ironstone fragments ranges from 2 to 35 percent in the subsoil
Concentrated minerals: None
Reaction: A horizon—moderately acid or slightly acid; Bt horizon—very strongly acid to slightly acid; Cr horizon—moderately acid to moderately alkaline

A horizon:
Color—dark reddish brown or dark brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

Bt horizon:
Color—red, reddish brown, or yellowish red to strong brown
Redoximorphic features—none
Texture—clay or gravelly clay
Other features—pebbles and ironstone fragment content range from 10 to 35 percent

Cr horizon:
Color—yellow, red, brown, or gray
Redoximorphic features—none
Texture—partially weathered glauconite and marl
Other features—none

Chireno Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Terraces
Parent material: Loamy, Pleistocene age alluvial and colluvial glauconitic sediments
Slope range: 0 to 1 percent
Taxonomic class: Fine, mixed, thermic Pachic Argiudolls

Typical Pedon

Chireno loam, in an area of Chireno loam, 0 to 1 percent slopes (fig. 14), in a pasture; from the intersection of Texas Highway 19 and Farm Road 227 in Grapeland, 4 miles east on Farm Road 227, 0.7 mile south on private field road, 600 feet east of road:

Ap—0 to 12 inches; very dark gray (10YR 3/1) loam, very dark grayish brown (10YR 3/2) dry; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable; many fine and medium roots; few tubular pores; few medium worm casts; slightly acid; gradual wavy boundary.

Bt1—12 to 20 inches; very dark gray (10YR 3/1) clay loam, very dark grayish brown (10YR 3/2) dry; common fine distinct dark yellowish brown (10YR 4/6) masses of iron accumulation; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable; many fine and common medium roots; many fine discontinuous tubular pores; few clay films in pores; few fine iron-manganese concretions; few medium worm casts; neutral; gradual wavy boundary.

Bt2—20 to 25 inches; very dark grayish brown (10YR 3/2) clay; common coarse faint dark yellowish brown (10YR 3/4) masses of iron accumulation; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm; common fine and few medium roots; common fine discontinuous tubular pores; few clay films in pores; few fine very dark gray spots; common very fine and fine iron-manganese concretions; few medium worm casts; neutral; gradual wavy boundary.

Bt3—25 to 41 inches; distinctly mixed with 40 percent very dark gray (10YR 3/1), 30 percent yellowish brown (10YR 5/4), and 30 percent dark yellowish brown (10YR 4/6) clay loam; moderate coarse prismatic structure parting to moderate medium angular blocky; hard, firm; common fine roots;

common fine discontinuous tubular pores; few clay films in pores; few thin discontinuous very dark gray (10YR 3/1) organic coats on surface of prisms; few medium masses of iron-manganese in lower part of horizon; neutral; gradual wavy boundary.

Bt4—41 to 60 inches; 60 percent dark yellowish brown (10YR 4/6), 30 percent very dark gray (10YR 3/1), and 10 percent reddish brown (2.5YR 4/4) clay loam; moderate coarse prismatic structure parting to moderate medium angular blocky; hard, firm; few fine roots; few fine discontinuous tubular pores; few clay films in pores; few thin discontinuous distinct very dark gray (10YR 3/1) organic coats on surface of prisms; common medium masses of iron-manganese; neutral; gradual wavy boundary.

Bt5—60 to 80 inches; dark yellowish brown (10YR 4/6) sandy clay loam; few fine distinct olive brown (2.5Y 4/4) masses; moderate coarse prismatic structure parting to moderate medium angular blocky; hard, firm; few fine roots; few fine discontinuous tubular pores; few clay films in pores; few thin discontinuous distinct very dark gray (10YR 3/1) organic coats on surface of prisms; common medium masses of iron-manganese; neutral.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 35 to 42 percent
Redoximorphic features: Few or common iron-manganese concretions and masses are in most pedons at more than 40 inches deep
Other distinctive soil features: Mollic epipedon that is 20 to 40 inches thick
Concentrated minerals: None
Reaction: A or Ap horizon—moderately acid to neutral; Bt horizon—slightly acid to slightly alkaline

A or Ap horizon:
Color—black, very dark brown, dark brown, very dark grayish brown, or very dark gray
Redoximorphic features—none
Texture—loam
Other features—none

Upper part of the Bt horizon:
Color—strong brown, dark grayish brown, very dark grayish brown, brown, yellowish brown, dark yellowish brown, light olive brown, olive brown, or very dark gray
Redoximorphic features—none
Texture—clay loam or clay
Other features—none

Middle part of the Bt horizon:
Color—strong brown, dark grayish brown, very dark grayish brown, brown, yellowish brown, dark yellowish brown, light olive brown, olive brown, or very dark gray with a mixture of low and high value and chroma colors
Redoximorphic features—none
Texture—clay loam or clay
Other features—none

Lower part of the Bt horizon:
Color—strong brown, dark grayish brown, very dark grayish brown, brown, yellowish brown, dark yellowish brown, light olive brown, olive brown, or very dark gray with dominantly high value and chroma colors
Redoximorphic features—masses of iron-manganese indicative of significant durations of saturation
Texture—sandy clay loam or clay loam
Other features—none

Cuthbert Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from stratified sandstone and shale
Slope range: 5 to 35 percent
Taxonomic class: Clayey, mixed, thermic Typic Hapludults

Typical Pedon

Cuthbert fine sandy loam, in an area of Cuthbert fine sandy loam, 5 to 15 percent slopes, in an area of woodland; from Texas Highway 7 in Ratcliff, 8.8 miles north on Farm Road 227, 2 miles east on U.S. Forest Service Road 526, 2.45 miles southeast on U.S. Forest Service Road 518, 250 feet southwest of road:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam; moderate fine granular structure; soft, very friable; common fine and medium roots; few ironstone pebbles; strongly acid; clear wavy boundary.

E—4 to 9 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; soft, very friable; common fine roots; few ironstone pebbles; strongly acid; clear wavy boundary.

Figure 14.—Profile of Chireno loam.

Figure 15.—Profile of Darco loamy fine sand.

Bt1—9 to 16 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, hard; few fine roots; common clay films; very strongly acid; gradual smooth boundary.

Bt2—16 to 23 inches; red (2.5YR 4/6) clay; few fine distinct strong brown (7.5YR 5/8) lithochromic mottles; moderate medium subangular blocky structure; firm, hard; few fine roots; common clay films; few fragments of light gray (10YR 7/1) shale; very strongly acid; gradual wavy boundary.

Bt3—23 to 28 inches; red (2.5YR 4/6) clay; common medium distinct strong brown (7.5YR 5/8) lithochromic mottles; moderate medium subangular blocky structure; firm, hard; few fine roots; common clay films; few fragments of light gray (10YR 7/1) shale; very strongly acid; gradual wavy boundary.

BCt—28 to 35 inches; red (2.5YR 4/6) clay, common medium distinct light gray (10YR 6/1) shale, and strong brown (7.5YR 5/8) sandstone; weak medium subangular blocky structure; firm, hard; few fine roots; few clay films; very strongly acid; gradual wavy boundary.

C1—35 to 48 inches; partially weathered horizontal layers of light gray (10YR 6/1) shale with texture of clay loam and red (2.5YR 4/6) and strong brown (7.5YR 5/8) sandstone with texture of fine sandy loam to sandy clay loam; weak coarse angular blocky structure; friable, hard; peds are coated with thick red continuous clay films; common fine flakes of mica; extremely acid; gradual wavy boundary.

C2—48 to 62 inches; stratified red (2.5YR 4/8) and strong brown (7.5YR 5/8) sandstone with texture of sandy clay loam and light gray (10YR 6/1) shale with texture of clay loam; strata are 1/4 inch to 4 inches thick; the sandy material is weakly cemented but can be easily cut with a spade; common fine flakes of mica mainly on surfaces of shale strata; extremely acid; gradual wavy boundary.

Range in Characteristics

Solum thickness: 20 to 40 inches

Clay content in the control section: 35 to 60 percent

Redoximorphic features: None

Other distinctive soil features: Silt content in the control section is less than 30 percent; ironstone and sandstone fragments on or partially imbedded in the A horizon cover less than 1 percent to about 20 percent of the surface

Concentrated minerals: None

Reaction: A and E horizons—very strongly acid or strongly acid; Bt and BCt horizons—extremely acid to strongly acid; C horizon—extremely acid or very strongly acid

A horizon:

Color—dark brown, brown, dark grayish brown, very dark grayish brown, or grayish brown

Redoximorphic features—none

Texture—fine sandy loam

Other features—rock fragments less than 3 inches in diameter range from less than 2 percent to about 35 percent

E horizon:

Color—brown, light brown, pale brown, yellowish brown, or light yellowish brown

Redoximorphic features—none

Texture—fine sandy loam

Other features—rock fragments less than 3 inches in diameter range from less than 2 percent to about 35 percent

Bt horizon:

Color—dark reddish brown, reddish brown, dark red, red, or yellowish red

Redoximorphic features—none

Texture—sandy clay loam, sandy clay, or clay

Other features—grayish or brownish horizontally oriented weathered shale fragments or strata are in the lower part of many pedons; coarse fragments range up to 15 percent

BCt horizon:

Color—stratified or variegated in shades of red, brown, yellow, and gray

Redoximorphic features—none

Texture—fine sandy loam, sandy clay loam, or clay loam with or without weathered sandstone and shale fragments

Other features—some pedons have only a few visible parent material fragments; coarse fragments range up to 15 percent

C horizon:

Color—shades of red, yellow, or brown with shale strata in shades of gray

Redoximorphic features—none

Texture—stratified weakly consolidated fine sandy loam, sandy clay loam, clay loam, and weakly cemented sandstone and shale

Other features—amount of sandstone or shale strata is variable and may be absent in some pedons; roots penetrate these materials but are concentrated along fractures or cleavage planes; coarse fragments range up to 15 percent

Darco Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Uplands
Parent material: Sandy and loamy marine sediments
Slope range: 1 to 15 percent
Taxonomic class: Loamy, siliceous, thermic Grossarenic Paleudults

Typical Pedon

Darco loamy fine sand, in an area of Darco loamy fine sand, 1 to 8 percent slopes (fig. 15), in a cemetery border area; northwest of Grapeland, 1.9 miles west on Farm Road 1272, 0.6 mile north along Parker Cemetery Road, 50 feet east of road:

Ap—0 to 12 inches; brown (10YR 4/3) loamy fine sand; single grained; loose; many fine and medium roots; moderately acid; gradual smooth boundary.
E1—12 to 26 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; loose; common fine roots; moderately acid; gradual smooth boundary.
E2—26 to 47 inches; pale brown (10YR 6/3) loamy fine sand; few fine faint light yellowish brown (10YR 6/4) stains; single grained; loose; few fine roots; moderately acid; clear wavy boundary.
Bt1—47 to 54 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium prominent dark red (2.5YR 3/6) masses of iron accumulation; weak medium subangular blocky structure; hard, friable; few fine roots; common clay films; strongly acid; gradual wavy boundary.
Bt2—54 to 68 inches; variegated red (2.5YR 4/6), strong brown (7.5YR 5/8), and light brownish gray (10YR 6/2) sandy clay loam; moderate medium subangular blocky structure; hard, friable; few fine roots; common clay films; strongly acid; gradual wavy boundary.
Bt3—68 to 82 inches; variegated red (2.5YR 4/6), strong brown (7.5YR 5/6), and light gray (10YR 7/2) sandy clay loam; weak fine subangular blocky structure; hard, friable; few fine roots; few clay films; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 12 to 35 percent
Redoximorphic features: None
Other distinctive soil features: None
Concentrated minerals: 0 to 5 percent plinthite segregations at more than 40 inches deep
Reaction: A or Ap and E horizons—very strongly acid to slightly acid; Bt horizon—very strongly acid or strongly acid

A or Ap horizon:
Color—very dark grayish brown, dark grayish brown, dark brown, or brown
Redoximorphic features—none
Texture—loamy fine sand
Other features—none

E horizon:
Color—brown, pale brown, light yellowish brown, or yellowish brown
Redoximorphic features—none
Texture—loamy fine sand
Other features—none
Thickness—combined thickness of the A and E horizons ranges from 40 to 72 inches

Bt horizon:
Color—red, strong brown, dark yellowish brown, yellowish red, strong brown, or yellowish brown
Redoximorphic features—none
Texture—fine sandy loam or sandy clay loam
Other features—plinthite ranges from 0 to 5 percent

Derly Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Loamy and clayey alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Fine, smectitic, thermic Typic Glossaqualfs

Typical Pedon

Derly loam, in an area of Freestone-Derly complex, 0 to 2 percent slopes, in a pasture; 6 miles west of Porter Springs on Farm Road 232, 100 feet west of road curve:

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak fine subangular blocky structure; slightly hard, friable; common fine and medium roots; common yellowish brown (10YR 5/6) root stains; moderately acid; gradual wavy boundary.
Eg—4 to 12 inches; light brownish gray (10YR 6/2)

loam; common fine distinct brownish yellow (10YR 6/6) redoximorphic concentrations; weak medium subangular blocky structure; hard, friable; common fine and medium roots; very strongly acid; clear irregular boundary.

Btg/E—12 to 23 inches; dark gray (10YR 4/1) clay loam; moderate medium subangular blocky structure; extremely hard, very firm; common fine roots; few pressure faces; few clay films; about 15 percent albic material (E) in the upper part and 5 percent in the lower part; very strongly acid; gradual wavy boundary.

Btg1—23 to 40 inches; dark gray (10YR 4/1) clay; common fine distinct light olive brown (2.5Y 5/4) redoximorphic concentrations; weak medium subangular blocky structure; extremely hard, very firm; few fine roots; common pressure faces; few clay films; few streaks of albic material (E); very strongly acid; gradual wavy boundary.

Btg2—40 to 64 inches; dark gray (10YR 4/1) clay; few fine distinct brownish yellow (10YR 6/8) redoximorphic concentrations; weak medium subangular blocky structure; extremely hard, very firm; few fine roots; common pressure faces; few slickensides; few streaks of albic material (E) in cracks; few black concretions; moderately acid; gradual wavy boundary.

Btg3—64 to 80 inches; variegated light gray (10YR 7/1), dark gray (10YR 4/1), and brownish yellow (10YR 6/8) clay loam; weak fine subangular blocky structure; very hard, very firm; few fine roots; common pressure faces; few slickensides; few black concretions; slightly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 35 to 45 percent
Redoximorphic features: Depleted matrix with redoximorphic concentrations or iron stains throughout
Other distinctive soil features: Glossic horizon
Concentrated minerals: None
Reaction: A or Ap and E horizons—very strongly acid to slightly acid; Btg/E and upper part of the Btg horizons—very strongly acid to moderately acid; lower part of the Btg horizon—strongly acid to neutral

A or Ap horizon:
Color—very dark grayish brown, dark grayish brown, dark brown, brown, or grayish brown; horizons with very dark grayish brown or dark brown colors are less than 7 inches thick
Redoximorphic features—grayish or brownish iron depletions range from none to common; yellowish or reddish iron stains are along root channels and pores during wet periods
Texture—loam
Other features—none

Eg horizon:
Color—grayish brown, light brownish gray, or light gray
Redoximorphic features—iron depletions in shades of gray and redoximorphic concentrations in shades of brown or yellow are few or common; yellowish or reddish iron stains are along root channels and pores during wet periods
Texture—loam
Other features—none

Btg/E horizon:
Color—dark gray, dark grayish brown, gray, grayish brown, light brownish gray, or light gray
Redoximorphic features—reddish, brownish, or yellowish redoximorphic concentrations and/or iron stains along root channels are few or common in most pedons
Texture—clay loam, silty clay loam, or clay
Other features—albic material (E) in the form of streaks, pockets, and interfingers make up 5 to 35 percent of the horizon; in some parts of the pedon, the horizon has 15 percent or more albic material in a layer at least 2 inches thick

Btg horizon:
Color—dark gray, dark grayish brown, gray, light gray, light brownish gray, or grayish brown
Redoximorphic features—few or common iron depletions in shades of gray and redoximorphic concentrations or stains in shades of brown, red, or yellow along root channels; or the horizon is variegated in these colors
Texture—clay or clay loam in the upper part; clay, silty clay loam, clay loam, or loam in the lower part
Other features—some pedons contain a few calcium carbonate concretions in the lower part, which typically are hard and pitted; pressure faces and slickensides range from none to few

BC horizon (where present):
Color—dark grayish brown, light brownish gray, or grayish brown
Redoximorphic features—few or common iron depletions in shades of gray and redoximorphic concentrations or stains in shades of brown, red, or yellow along root

channels; or the horizon is variegated in these colors

Texture—clay loam, silty clay loam, or loam

Other features—some pedons contain a few calcium carbonate concretions in the lower part, which typically are hard and pitted

Eastham Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Clayey alluvium from alkaline river and stream deposits
Slope range: 0 to 3 percent
Taxonomic class: Fine, smectitic, thermic Typic Hapluderts

Typical Pedon

Eastham clay, in an area of Eastham clay, 1 to 3 percent slopes (fig. 16), in a pasture; from the intersection of Loop 304 and Texas Highway 21 on the west side of Crockett, about 18 miles southwest on Texas Highway 21 to the intersection of Farm Road 2498, 0.35 mile east on private road, 0.15 mile north of road:

Ap—0 to 4 inches; very dark gray (10YR 3/1) clay; moderate fine and medium angular blocky structure; very hard, very firm; many fine and medium roots; few fine vesicular and tubular pores; few siliceous pebbles; moderately acid; clear wavy boundary.

A—4 to 17 inches; very dark gray (10YR 3/1) clay; few medium faint grayish brown (10YR 5/2) iron depletions; moderate medium angular blocky structure; very hard, very firm; many fine and medium roots; few fine vesicular and tubular pores; few stains of prominent dark yellowish brown iron-manganese; few pressure faces; few siliceous pebbles; moderately acid; gradual wavy boundary.

Bss1—17 to 27 inches; black (5Y 2.5/1) clay; few medium distinct brown (10YR 5/3) relict redoximorphic concentrations; moderate medium and coarse angular blocky structure; very hard, very firm; common fine roots; few fine vesicular and tubular pores; few stains of prominent brown and dark brown iron-manganese; many slickensides; few siliceous pebbles; strongly acid; gradual wavy boundary.

Bss2—27 to 40 inches; black (5Y 2.5/1) clay; moderate

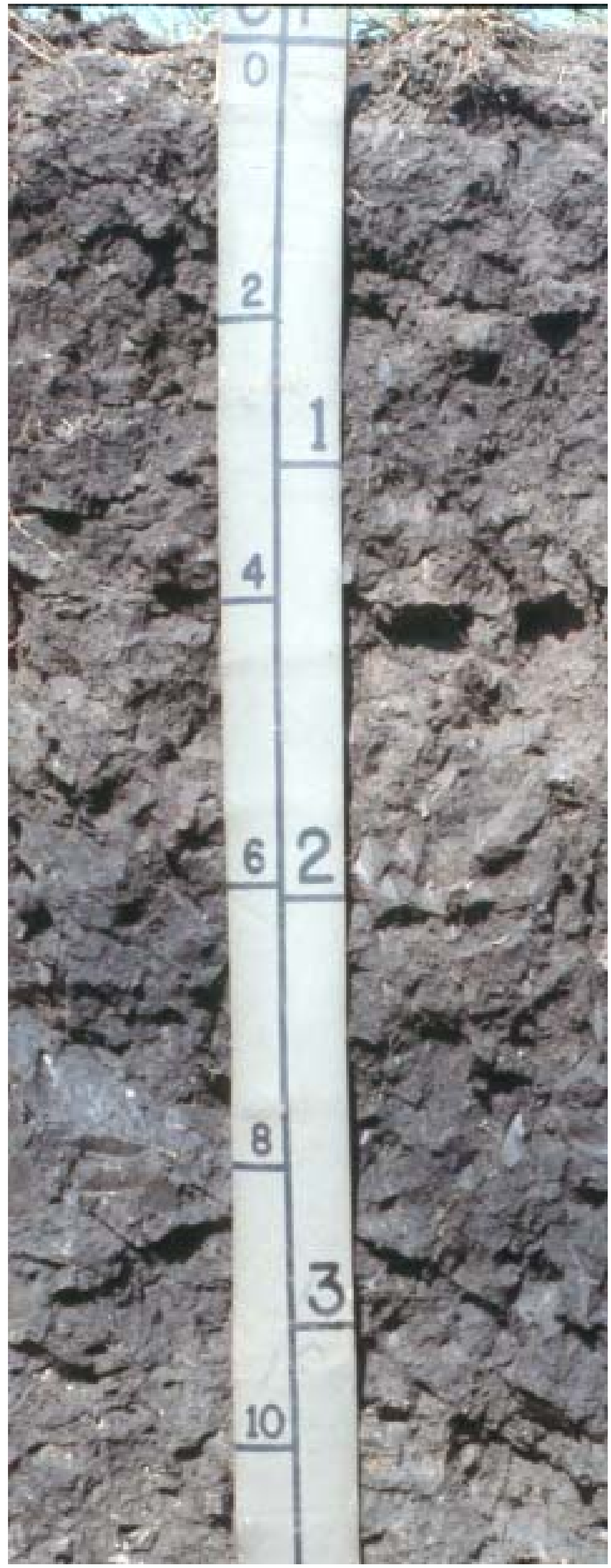


Figure 16.—Profile of Eastham clay.

medium angular blocky structure; very hard, very firm; common fine roots; few fine vesicular and tubular pores; many slickensides that are tilted 45 to 50 degrees from horizontal; few siliceous pebbles; neutral; clear wavy boundary.

Bkss1—40 to 46 inches; dark gray (10YR 4/1) clay; many medium distinct light olive brown (2.5Y 5/4) relict redoximorphic concentrations; moderate medium angular blocky structure; very hard, very firm; common fine roots throughout; few fine vesicular and tubular pores; many slickensides; common fine masses and threads of calcium carbonate; weakly effervescent; slightly alkaline; clear wavy boundary.

Bkss2—46 to 57 inches; dark grayish brown (2.5Y 4/2) clay; common fine and medium faint grayish brown (2.5Y 5/2) relict iron depletions and common fine distinct olive yellow (2.5Y 6/6) relict redoximorphic concentrations; moderate coarse angular blocky structure; very hard, very firm; few fine roots; few fine vesicular and tubular pores; common slickensides; common fine concretions and masses and few fine threads of calcium carbonate; weakly effervescent; slightly alkaline; gradual wavy boundary.

BCkss—57 to 70 inches; gray (10YR 6/1) silty clay; many medium prominent yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/6) relict redoximorphic concentrations; moderate medium angular blocky structure; very hard, very firm; few fine roots; few fine vesicular and tubular pores; many slickensides; common fine masses, concretions, and threads of calcium carbonate; strongly effervescent; slightly alkaline; gradual wavy boundary.

BCss—70 to 88 inches; light brownish gray (10YR 6/2) silty clay; many medium prominent brownish yellow (10YR 6/8) and few fine distinct dark yellowish brown (10YR 4/6) relict redoximorphic concentrations; weak medium angular blocky structure; very hard, firm; few fine roots; few fine vesicular and tubular pores; many slickensides; few fine concretions and masses of calcium carbonate; few pitted nodules of calcium carbonate; slightly alkaline.

Range in Characteristics

Solum thickness: More than 80 inches

Clay content in the control section: 45 to 60 percent

Redoximorphic features: Redoximorphic concentrations in shades brown, yellow, or olive

Other distinctive soil features: Gilgai microrelief with micro-knolls about 6 to 10 inches higher than depressions; when dry, cracks 1 inch to 3 inches wide extend from the surface to more than 40 inches deep and remain open for 60 to 90 cumulative days in most years; slickensides begin at 12 to 22 inches deep

Concentrated minerals: Concretions, soft masses, or threads of calcium carbonate and gypsum crystals are in the subsoil

Reaction: Upper part of the A horizon—moderately acid to slightly alkaline; lower part of the A and Bss horizons—slightly acid to moderately alkaline; Bkss and BC horizons—neutral to moderately alkaline; BC horizon is slightly effervescent to noneffervescent in dilute HCl

A or Ap horizon:

Color—black or very dark gray

Redoximorphic features—none

Texture—clay

Other features—none

Thickness—ranges from 6 inches on micro-knolls to 22 inches in the depressions; average thickness in more than half of the pedon is 12 inches

Bss horizon:

Color—very dark gray, very dark grayish brown, dark grayish brown, dark gray, grayish brown, gray, light gray, light brownish gray, dark olive gray, olive gray, or light olive gray

Redoximorphic features—none

Texture—clay

Other features—none

Bkss horizon:

Color—very dark gray, very dark grayish brown, dark grayish brown, dark gray, grayish brown, gray, light gray, light brownish gray, dark olive gray, olive gray, or light olive gray

Redoximorphic features—relict redoximorphic concentrations in shades brown, yellow, or olive range from none to common

Texture—clay

Other features—few or common concretions, masses, and threads of calcium carbonate

BC horizon:

Color—dark gray, gray, light gray, dark grayish brown, grayish brown, light brownish gray, olive gray, light olive gray, dark brown, brown, dark yellowish brown, yellowish brown, light yellowish brown, olive yellow, olive, pale olive, or light olive brown

Redoximorphic features—relict redoximorphic concentrations in shades of brown, yellow, or olive range from few to many; or the horizon is variegated in these colors

Texture—clay or silty clay
Other features—few or common concretions, masses, and threads of calcium carbonate; gypsum crystals range from none to few

Elrose Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Uplands
Parent material: Marine sediments high in glauconite
Slope range: 1 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Paleudalfs

Typical Pedon

Elrose fine sandy loam, in an area of Elrose fine sandy loam, 1 to 3 percent slopes, in a pasture; about 7 miles west of Grapeland on Farm Road 227, from the intersection of Farm Road 227 and Farm Road 2544, about 2.2 miles west along Farm Road 2544, 0.8 mile west along dirt road, 200 feet south of road:

Ap—0 to 5 inches; dark brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; loose, friable; many fine and few coarse roots; common fine pores; extremely acid; clear smooth boundary.
E—5 to 12 inches; brown (7.5YR 5/4) fine sandy loam; weak medium subangular blocky structure; slightly hard, friable; common fine and medium roots; common fine pores; very strongly acid; clear smooth boundary.
Bt1—12 to 20 inches; dark red (2.5YR 3/6) sandy clay loam; very few fine distinct yellowish red (5YR 5/6) masses of iron accumulation; moderate medium subangular blocky structure; hard, friable; common fine and few medium roots; common fine pores; common clay films; moderately acid; gradual smooth boundary.
Bt2—20 to 42 inches; dark red (10R 3/6) clay; moderate medium subangular blocky structure; hard, firm; common fine and few medium roots; common fine pores; few clay films; strongly acid; gradual smooth boundary.
Bt3—42 to 64 inches; red (10R 4/6) clay; moderate medium subangular blocky structure; hard, firm; few fine and medium roots; few fine pores; few clay films; strongly acid; clear irregular boundary.
Bt4—64 to 80 inches; dark red (2.5YR 3/6) sandy clay; few medium prominent yellowish brown (10YR 5/8) masses of iron accumulation; moderate medium subangular blocky structure; hard, firm; few fine roots; few fine pores; few clay films; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 25 to 35 percent
Redoximorphic features: None
Other distinctive soil features: Iron accumulations in shades of red, yellow, or brown
Concentrated minerals: None
Reaction: A or Ap, E, and EB (where present) horizons—extremely acid to slightly; Bt horizon—very strongly acid to slightly acid

A or Ap horizon:
Color—dark brown, strong brown, brown, dark grayish brown, dark yellowish brown, grayish brown, yellowish brown, red, reddish brown, dark reddish gray, yellowish red, or reddish gray
Redoximorphic features—none
Texture—fine sandy loam
Other features—ironstone pebbles range from 0 to 15 percent, by volume

E horizon and EB horizon (where present):
Color—dark brown, dark yellowish brown, brown, yellowish brown, pale brown, light yellowish brown, or light brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—ironstone pebbles range from 0 to 15 percent, by volume

Upper part of the Bt horizon:
Color—dusky red, weak red, dark red, red, dark reddish brown, reddish brown, strong brown, or yellowish red
Redoximorphic features—none
Texture—loam, sandy clay loam, or clay loam
Other features—ironstone pebbles range up to 10 percent, by volume

Lower part of the Bt horizon:
Color—dusky red, red, light red, dark red, yellowish red, or reddish yellow
Redoximorphic features—none
Texture—clay loam, sandy clay, and clay; clay content ranges from 30 to 55 percent and is greater than 35 percent in some parts; some pedons have sandy clay loam, fine sandy loam, or loam textures below a depth of 60 inches

Other features—weathered glauconitic materials in spots or fragments range from none to common; some pedons have a few streaks of clean sand in the lower part; ironstone pebbles range up to 10 percent, by volume

Etoile Series

Depth class: Deep
Drainage class: Moderately well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from calcareous shale
Slope range: 1 to 3 percent
Taxonomic class: Fine, smectitic, thermic Vertic Hapludalfs

Typical Pedon

Etoile loam, in an area of Etoile loam, 1 to 3 percent slopes, in a pasture; about 10 miles west of Crockett on Texas 21 to Mustang Prairie headquarters, 1 mile north on farm lane, left at fork in road, 0.6 mile west and north along farm lane, 200 feet west at old fence row then 75 feet northwest:

Ap—0 to 4 inches; dark brown (10YR 4/3) loam; moderate fine subangular blocky structure; slightly hard, friable; common fine roots; slightly acid; clear wavy boundary.

Bt—4 to 9 inches; yellowish red (5YR 5/8) clay; few medium distinct yellowish red (5YR 4/6) relict redoximorphic concentrations; moderate medium subangular blocky structure; very hard, very firm; common fine roots; few clay films; strongly acid; gradual wavy boundary.

Btss1—9 to 18 inches; yellowish brown (10YR 5/6) clay; few medium distinct yellowish red (5YR 5/8) relict redoximorphic concentrations; moderate medium subangular blocky structure; very hard, very firm; few fine roots; few chert and ironstone pebbles; common slickensides; common clay films; slightly acid; gradual wavy boundary.

Btss2—18 to 39 inches; dark grayish brown (2.5Y 4/2) clay; few fine distinct light yellowish brown (2.5Y 6/4) relict redoximorphic concentrations; moderate fine subangular blocky structure; very hard, very firm; few fine roots; few chert and ironstone pebbles; common slickensides; common clay films; slightly acid; clear wavy boundary.

Bkss—39 to 47 inches; light brownish gray (2.5Y 6/2) clay; common medium distinct brownish yellow (10YR 6/8) relict redoximorphic concentrations; weak medium subangular blocky structure; very hard, very firm; few fine roots; common masses and concretions of calcium carbonate; common slickensides; common clay films; slightly effervescent; slightly alkaline; clear smooth boundary.

Cy—47 to 60 inches; layered light brownish gray (10YR 6/2), brown (10YR 5/3), and brownish yellow (10YR 6/8) shale with texture of clay; very hard, very firm; common gypsum crystals; neutral.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 40 to 60 percent
Redoximorphic features: Yellowish brown relict redoximorphic concentrations; gray and light brownish gray relict iron depletions
Other distinctive soil features: During some months in most years, the soil has deep and wide cracks that extend to depths of 20 inches below the surface; layers with slightly acid or neutral reaction are at 25 to 50 inches deep
Concentrated minerals: Masses and concretions of calcium carbonate and gypsum crystals are in the lower parts of the soil
Reaction: A or Ap, E (where present), Bt, and Btss horizons—strongly acid to neutral; Bkss and Cy horizons—neutral to moderately alkaline

A or Ap horizon:
Color—dark brown, dark grayish brown, or very dark grayish brown
Redoximorphic features—none
Texture—loam
Other features—none

E horizon (where present):
Color—brown, pale brown, light brownish gray, light yellowish brown, or brownish yellow
Redoximorphic features—none
Texture—loam
Other features—none
Thickness—combined thickness of the A and E horizons is less than 10 inches

Bt horizon:
Color—red, yellowish red, yellowish brown, or strong brown
Redoximorphic features—none
Texture—clay
Other features—none

Upper part of the Btss horizon:
Color—red, yellowish red, yellowish brown, or strong brown

Redoximorphic features—yellowish brown relict redoximorphic concentrations; gray and light brownish gray relict iron depletions
Texture—clay
Other features—few or common slickensides and pressure faces

Lower part of the Btss horizon:
Color—light brownish gray, Light olive brown, olive brown, olive, pale olive, or olive yellow
Redoximorphic features—yellowish red or yellowish brown relict redoximorphic concentrations; gray relict iron depletions
Texture—clay
Other features—few or common slickensides and pressure faces

Bkss horizon:
Color—light brownish gray, light olive brown, olive brown, olive, pale olive, or olive yellow
Redoximorphic features—yellowish red or yellowish brown relict redoximorphic concentrations; gray relict iron depletions
Texture—clay
Other features—few or common masses and concretions of calcium carbonate; few or common slickensides and pressure faces

Cy horizon:
Color—light brownish gray, light olive brown, olive brown, olive, pale olive, or olive yellow
Redoximorphic features—none
Texture—platy calcareous shale with texture of clay loam to clay
Other features—Few or common gypsum crystals

Freestone Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Clayey alluvium from acid and alkaline river and stream deposits
Slope range: 0 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Glossaquic Paleudalfs

Typical Pedon

Freestone fine sandy loam, in an area of Freestone fine sandy loam, 1 to 3 percent slopes, in a pasture; about 8.4 miles west of Porter Springs on Farm Road 132, 3.3 miles northeast on Potter farm lane to north headquarters, 1.1 miles northeast to the corner of the farm:

Ap—0 to 4 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; hard, very friable; common fine and medium roots; few fine pores; strongly acid, clear smooth boundary.
E—4 to 11 inches; pale brown (10YR 6/3) fine sandy loam; weak fine subangular blocky structure; hard, very friable; common fine and medium roots; few fine pores; strongly acid; clear wavy boundary.
Bt1—11 to 23 inches; brownish yellow (10YR 6/6) sandy clay loam; moderate medium subangular blocky structure; very hard, friable; common fine and medium roots; few fine and medium pores; few clay films; very strongly acid; gradual wavy boundary.
Bt/E1—23 to 35 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium distinct dark red (2.5YR 3/6) redoximorphic concentrations and few fine distinct gray (10YR 5/1) iron depletions; moderate medium subangular blocky structure; very hard, firm; common fine roots; few fine pores; few patchy clay films; about 5 percent albic material (E); very strongly acid; gradual wavy boundary.
Bt/E2—35 to 40 inches; distinctly variegated brownish yellow (10YR 6/6), light brownish gray (10YR 6/2), and dark red (2.5YR 3/6) clay loam; moderate medium subangular blocky structure; hard, firm; few fine roots; few fine pores; common clay films; about 8 percent albic material (E); very strongly acid; diffuse wavy boundary.
Bt/E3—40 to 52 inches; prominently variegated strong brown (7.5YR 5/8), red (2.5YR 4/6), and light brownish gray (10YR 6/2) clay loam; moderate medium subangular blocky structure; very hard, friable; few fine pores; few fine roots; few pores; common clay films; about 10 percent albic material (E); very strongly acid; gradual wavy boundary.
Bt/E4—52 to 81 inches; variegated yellowish red (5YR 5/8), dark reddish brown (2.5YR 3/4), red (2.5YR 4/8), and light brownish gray (10YR 6/2) clay loam; moderate medium subangular blocky structure; hard, firm; few fine roots; common clay films; about 5 percent albic material (E); very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 20 to 35 percent
Redoximorphic features: Redoximorphic concentrations in shades of brown, red, and yellow; iron depletions in shades of gray

Other distinctive soil features: None
Concentrated minerals: Some pedons have secondary carbonates at more than 70 inches deep
Reaction: A or Ap horizon—strongly acid to slightly acid; E horizon—strongly acid to neutral; Bt and Bt/E horizons—very strongly acid to moderately acid

A or Ap horizon:
Color—very dark grayish brown, dark grayish brown, grayish brown, dark brown, brown, dark yellowish brown, light yellowish brown, yellowish brown, light grayish brown, light brown, pinkish gray, or pale brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none
Thickness—A horizons with very dark grayish brown or dark brown color are less than 7 inches

E horizon:
Color—light yellowish brown, brownish yellow, pale brown, light brown, and reddish yellow
Redoximorphic features—none
Texture—fine sandy loam or loam
Other features—none

Bt horizon:
Color—brown, yellowish brown, strong brown, light brown, light yellowish brown, yellow, brownish yellow, or reddish yellow
Redoximorphic features— none to few iron depletions in shades of gray and redoximorphic concentrations in shades of brown and red
Texture—loam, sandy clay loam, or clay loam
Other features—streaks or small masses of albic material range from none to less than 5 percent, by volume

Bt/E horizon:
Color—shades of brown, gray, and red; or the horizon is variegated in these colors
Redoximorphic features—few to many redoximorphic concentrations in shades of brown, red, and yellow and iron depletions in shades of gray
Texture—loam, sandy clay loam, clay loam, or clay
Other features—streaks, coatings, and pockets of albic material make up 5 to 15 percent, by volume

Fuller Series

Depth class: Deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Loamy marine sediments deposited over clayey mudstone or shale
Slope range: 0 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Albic Glossic Natraqualfs

Typical Pedon

Fuller fine sandy loam, in an area of Fuller fine sandy loam, 1 to 3 percent slopes, in an area of woodland; from Kennard, Texas, at the intersection of Texas Highway 7 and U.S. Forest Service Road 525, 4.8 miles south on U.S. Forest Service Road 525 to the intersection of U.S. Forest Service Road 549, 0.5 mile east on U.S. Forest Service Road 549 to the intersection of U.S. Forest Service Road 596, 0.2 mile northeast on U.S. Forest Service Road 596, 30 feet northwest of road:

A—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; soft, friable; many fine, medium, and coarse roots; very strongly acid; clear smooth boundary.
Eg—7 to 12 inches; light brownish gray (10YR 6/2) fine sandy loam; few fine faint brownish yellow (10YR 6/6) redoximorphic concentrations; weak medium subangular blocky structure; slightly hard, friable; many fine, medium, and coarse roots; very strongly acid; clear wavy boundary.
E/Btg—12 to 27 inches; 60 percent light brownish gray (10YR 6/2) fine sandy loam (E); common medium distinct brownish yellow (10YR 6/6) redoximorphic concentrations; weak fine subangular blocky structure; hard, friable; common fine and medium roots; 40 percent grayish brown (10YR 5/2) loam (Btg); very strongly acid; gradual wavy boundary.
Btng/E1—27 to 45 inches; grayish brown (10YR 5/2) loam; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; moderate coarse columnar structure; very hard, firm; few fine and medium roots; common clay films; about 25 percent albic material (E) between peds; few siliceous pebbles 5 to 20 millimeters in diameter; slightly acid; gradual irregular boundary.
Btng/E2—45 to 51 inches; grayish brown (10YR 5/2) clay loam; common fine and medium distinct brownish yellow (10YR 6/6) redoximorphic

concentrations; moderate coarse columnar structure; very hard, firm; few fine roots; common clay films; about 20 percent albic material (E) between peds; few small pockets of white salts; neutral; gradual irregular boundary.

2C—51 to 65 inches; light brownish gray (2.5Y 6/2) mudstone with texture of clay loam; massive; thin black iron-manganese layers cover some rock faces; few small pockets of white salts; neutral.

Range in Characteristics

Solum thickness: 40 to 60 inches

Clay content in the control section: 18 to 35 percent

Redoximorphic features: Redoximorphic concentrations in shades of brown or yellow; iron depletions in shades of gray

Other distinctive soil features: Silt content in the control section ranges from 25 to 45 percent; electrical conductivity ranges from 0.4 to 4.0 mmhos/cm; sodium adsorption ratio ranges from 13 to 20 in the upper part of the control section

Concentrated minerals: Barite, gypsum, calcite, and other salts are common in the subsoil and substratum in most pedons

Reaction: A horizon—very strongly acid to moderately acid; Eg and E/Btg horizons—extremely acid to slightly acid; Btng/E and 2C/Bt (where present) horizons—slightly acid to moderately alkaline; 2C horizon—neutral to moderately alkaline

A horizon:

Color—very dark grayish brown, dark grayish brown, or grayish brown

Redoximorphic features—none

Texture—fine sandy loam

Other features—aluminum saturation ranges from 20 to 40 percent

Eg horizon:

Color—dark gray, dark grayish brown, gray, grayish brown, light gray, or light brownish gray

Redoximorphic features—redoximorphic concentrations in shades of red, brown, or yellow range from none to many

Texture—very fine sandy loam, fine sandy loam, or loam

Other features—aluminum saturation ranges from 20 to 40 percent in the upper part; sodium adsorption ratio in the lower part of the E horizon ranges from 1 to 5; wavy strata of silty clay loam material that has darker colors are in most pedons

E/Btg horizon:

Color—dark gray, dark grayish brown, brownish gray, gray, grayish brown, light gray, or light brownish gray

Redoximorphic features—redoximorphic concentrations in shades of red, brown, or yellow range from none to many

Texture—very fine sandy loam, fine sandy loam, or loam

Other features—sodium adsorption ratio ranges from 1 to 5

Btng/E horizon:

Color—grayish brown, very dark gray, very dark grayish brown, dark gray, or dark grayish brown streaks and masses (Bt); grayish brown, brown, light brownish gray, pale brown, light gray, or very pale brown (E)

Redoximorphic features—redoximorphic concentrations in shades of brown or yellow range from none to common and are mainly in the interior of peds; iron depletions in shades of gray are on ped faces

Texture—streaks and masses of loam, clay loam, or silty clay loam

Other features—ped interiors are mudstone parent materials that are seemingly little weathered surrounded by darker and grayish argillic materials with streaks and pockets of albic material (E) and crawfish krotovinas between peds; sodium adsorption ratio ranges from 13 to 20

2C/Bt horizon (where present):

Color—grayish brown, brown, yellowish brown, light brownish gray, pale brown, light yellowish brown, light gray, very pale brown, light olive brown, olive gray, olive, light olive gray, or pale yellow (2C)

Redoximorphic features—redoximorphic concentrations in shades of brown or yellow range from none to common and are mainly in the interior of peds; iron depletions in shades of gray are on ped faces

Texture—mudstone that has conchoidal fractures with texture of clay loam (2C); streaks and masses of loam, clay loam, or silty clay loam (Bt)

Other features—barite and other salts are common in most pedons; electrical conductivity ranges from 1 to 4 mmhos/cm; sodium adsorption ratio ranges from 10 to 25

2C horizon:

Color—grayish brown, brown, yellowish brown, light brownish gray, pale brown, light yellowish

brown, light gray, very pale brown, light olive brown, olive gray, olive, pale olive, or pale yellow
Redoximorphic features—none
Texture—consolidated mudstone with texture of clay loam or clay
Other features—barite, gypsum, calcite, and other salts are common in most pedons, mainly along fractures

Garner Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Clayey alluvium from alkaline river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Fine, smectitic, thermic Oxyaquic Hapluderts

Typical Pedon

Garner clay, in an area of Garner clay, 0 to 1 percent slopes, in a pasture; from the intersection of Loop 304 and Texas Highway 21 on the west side of Crockett, 6 miles west of Crockett on Texas Highway 21, 3.4 miles north on Dixon-Hopewell Road, 0.25 mile west on John Spinks farm lane, 50 feet south of lane:

Ap—0 to 7 inches; very dark gray (10YR 3/1) clay; weak fine subangular blocky structure; very hard, firm; many fine and medium roots; few fine pores; common worm casts; moderately acid; clear wavy boundary.

Bw—7 to 10 inches; dark gray (10YR 4/1) clay; few fine prominent yellowish brown (10YR 5/6) relict redoximorphic concentrations and faint very dark gray (10YR 3/1) organic stains; moderate fine subangular blocky structure; extremely hard, very firm; many fine and medium roots; few fine pores; common worm casts; moderately acid; clear wavy boundary.

Bss—10 to 22 inches; dark gray (10YR 4/1) clay; common fine distinct yellowish brown (10YR 5/8) relict redoximorphic concentrations and few fine faint gray (10YR 5/1) relict iron depletions; weak fine subangular blocky structure; extremely hard, very firm; common fine and medium roots; few fine pores; common worm casts; common pressure faces; few large grooved slickensides; moderately acid; clear wavy boundary.

Bssg1—22 to 28 inches; gray (10YR 5/1) clay; common medium distinct strong brown (7.5YR 5/8) relict redoximorphic concentrations and common fine faint dark gray (10YR 4/1) relict iron depletions; weak fine angular blocky structure; extremely hard, very firm; common fine and medium roots; few fine pores; common worm casts; many slickensides; common pressure faces; moderately acid; clear wavy boundary.

Bssg2—28 to 45 inches; dark grayish brown (2.5Y 4/2) clay; common fine distinct gray (2.5Y 5/0) relict iron depletions and faint light olive brown (2.5Y 5/4) relict redoximorphic concentrations; moderate fine angular blocky structure; extremely hard, very firm; common fine roots; few fine pores; common worm casts; common slickensides; slightly acid; clear wavy boundary.

Bkssg1—45 to 56 inches; gray (10YR 5/1) clay; common medium distinct grayish brown (2.5Y 5/2) relict iron depletions and few fine distinct strong brown (7.5YR 5/8) relict redoximorphic concentrations; weak very fine angular blocky structure; extremely hard, very firm; few fine roots; few fine pores; common slickensides; common calcium carbonate concretions; slightly alkaline; clear wavy boundary.

Bkssg2—56 to 80 inches; gray (2.5Y 5/0) clay; few fine distinct brownish yellow (10YR 6/8) relict redoximorphic concentrations; moderate fine angular blocky structure; extremely hard, very firm; few fine roots; few fine pores; common slickensides; common calcium carbonate concretions and gypsum crystals; slightly alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 50 to 60 percent
Redoximorphic features: Relict redoximorphic concentrations and iron depletions in shades of brown, yellow, or olive
Other distinctive soil features: Undisturbed areas have gilgai microrelief; cracks 1 inch to 3 inches wide at the surface extend to more than 20 inches deep during the summer of most years; cracks are open for 60 to 90 cumulative days during most years; intersecting slickensides begin at 15 to 30 inches deep
Concentrated minerals: Calcium carbonate concretions or gypsum crystals in the lower part of the solum
Reaction: A or Ap and Bw horizons—moderately acid to slightly alkaline; Bss horizon—moderately acid to neutral; Bkss horizon—moderately acid to moderately alkaline

Ap or A horizon:
- Color—very dark gray, dark gray, gray, or light gray; more than 70 percent of the pedon has lighter color within 12 inches of the surface
- Redoximorphic features—none
- Texture—clay
- Other features—none
- Thickness—2 to 35 inches

Bss and Bssg horizons:
- Color—dark gray, gray, grayish brown, dark grayish brown, light gray, or light brownish gray
- Redoximorphic features—few to many relict redoximorphic concentrations in shades of brown, yellow, and red
- Texture—silty clay or clay
- Other features—few or common slickensides

Bkssg horizon:
- Color—gray, dark gray, dark grayish brown, light olive gray, olive gray, light olive brown, olive, or pale olive
- Redoximorphic features—few or common relict redoximorphic concentrations in shades of brown, yellow, or olive
- Texture—silty clay or clay
- Other features—most pedons contain calcium carbonate concretions or gypsum crystals

Grapeland Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landscape: Coastal plain
Landform: Uplands
Parent material: Sandy marine sediments
Slope range: 1 to 4 percent
Taxonomic class: Sandy, siliceous, thermic Psammentic Paleudults

Typical Pedon

Grapeland fine sand, in an area of Grapeland fine sand, 1 to 4 percent slopes (fig. 17), in a pasture; from the intersection of U.S. Highway 287 and Farm Road 228 in Grapeland, 7 miles north on U.S. Highway 287 to the entrance of Lake Wood Ranch, 0.2 mile east to farmstead then 0.4 mile northeast:

Ap—0 to 3 inches; dark yellowish brown (10YR 4/4) fine sand; weak medium subangular blocky structure; soft, very friable; many fine and medium roots; common fine pores; few fine ironstone nodules; strongly acid; clear smooth boundary.

Figure 17.—Profile of Grapeland fine sand.

A—3 to 12 inches; yellowish brown (10YR 5/6) fine sand; weak medium and coarse subangular blocky structure; soft, very friable; common fine roots; common fine pores; few thin discontinuous lamellae at Bt contact; few fine ironstone nodules; strongly acid; abrupt smooth boundary.

Bt1—12 to 39 inches; yellowish red (5YR 5/8) loamy fine sand; weak medium and coarse subangular blocky structure; slightly hard, friable; common fine roots; many fine and medium pores; few streaks of pale brown (10YR 6/3) uncoated sand; few stains of iron-manganese; faint yellowish red discontinuous clay bridges between some sand grains; few fine ironstone nodules; extremely acid; gradual smooth boundary.

Bt2—39 to 52 inches; yellowish red (5YR 5/8) loamy fine sand; weak coarse subangular blocky structure; slightly hard, friable; common fine roots; many fine and medium pores; clay bridging evident; few streaks of very pale brown (10YR 7/3) uncoated sand; few fine ironstone nodules; very strongly acid; clear wavy boundary.

Bt3—52 to 80 inches; yellowish red (5YR 5/8) loamy fine sand; weak medium subangular blocky structure; slightly hard, friable; common fine roots; many fine and medium pores; clay bridging evident; few fine faint reddish lamellae; few streaks and spots up to 1/2 inch across of very pale brown (10YR 7/3) uncoated sand, some of which have red edges; few fine ironstone nodules; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 6 to 12 percent
Redoximorphic features: None
Other distinctive soil features: Dry in some parts of the moisture control section for 75 to 90 days in most years
Concentrated minerals: Rounded ironstone nodules, mainly less than 1/2 inch across, range from none to few throughout
Reaction: A or Ap and E horizons—very strongly acid to slightly acid; Bt horizon—extremely acid to slightly acid

A or Ap horizon:
Color—dark brown, brown, dark yellowish brown, or yellowish brown
Redoximorphic features—none
Texture—fine sand
Other features—none

E horizon (where present):
Color—brown, pale brown, light yellowish brown, or yellowish brown
Redoximorphic features—none
Texture—fine sand
Other features—none

Upper part of the Bt horizon:
Color—yellowish red, reddish yellow, red, or light red
Redoximorphic features—none
Texture—loamy sand or loamy fine sand
Other features—contains at least 3 percent more clay than the horizon above; streaks and spots of uncoated sand range from none to about 5 percent

Lower part of the Bt horizon:
Color—yellowish red, reddish yellow, red, or light red
Redoximorphic features—none
Texture—fine sand, loamy sand, or loamy fine sand
Other features—few or common streaks and spots of uncoated sand

Hainesville Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Sandy alluvium from river and stream deposits
Slope range: 0 to 2 percent
Taxonomic class: Thermic, coated Argic Quartzipsamments

Typical Pedon

Hainesville fine sand, in an area of Hainesville fine sand, 0 to 2 percent slopes (fig. 18), in an area of cropland; from the intersection of Loop 304 and Texas Highway 7 on the west side of Crockett, 4.5 miles west on Texas Highway 7 to Farm Road 132, 4.5 miles southwest on Farm Road 132 to end of pavement, 2 miles west on county road to cattle guard, 0.3 mile west on private road, 0.25 mile south of road:

Ap—0 to 5 inches; yellowish brown (10YR 5/4) fine sand; single grained; very friable; many fine and medium roots; common fine vesicular and tubular pores; common fine and medium worm casts;

about 1 percent siliceous pebbles; strongly acid; clear smooth boundary.

A—5 to 14 inches; yellowish brown (10YR 5/4) fine sand; weak coarse subangular blocky structure; very friable; many fine roots; common fine vesicular and tubular pores; few fine black iron-manganese masses; common fine and medium worm casts; about 1 percent siliceous pebbles; strongly acid; abrupt smooth boundary.

Bw—14 to 28 inches; strong brown (7.5YR 5/6) loamy fine sand; few fine distinct very pale brown (10YR 8/3) spots of uncoated sand; weak coarse subangular blocky structure; very friable; common fine roots; common fine vesicular and tubular pores; few fine iron-manganese masses; about 1 percent siliceous pebbles; very strongly acid; gradual smooth boundary.

Bw/E1—28 to 45 inches; strong brown (7.5YR 5/6) loamy fine sand; common fine distinct very pale brown (10YR 8/3) spots of uncoated sand (E); weak coarse subangular blocky structure; very friable; common fine roots; many fine vesicular and tubular pores; very few iron-manganese coatings in root channels; about 1 percent siliceous pebbles; extremely acid; gradual smooth boundary.

Bw/E2—45 to 58 inches; yellowish brown (10YR 5/6) loamy fine sand; many medium distinct very pale brown (10YR 8/3) spots of uncoated sand (E); weak coarse subangular blocky structure; very friable; common fine roots; many fine vesicular and tubular pores; about 1 percent siliceous pebbles; extremely acid; clear wavy boundary.

Bw/E3—58 to 70 inches; brownish yellow (10YR 6/6) loamy fine sand; many medium distinct very pale brown (10YR 8/3) spots of uncoated sand (E); weak coarse subangular blocky structure; loose, very friable; common fine roots; many fine, medium, and coarse vesicular pores; few strong brown (7.5YR 5/8) lamellae 0.2 to 1.0 centimeters thick make up combined thickness of 5 centimeters; about 1 percent siliceous pebbles; extremely acid; clear wavy boundary.

B&E—70 to 80 inches; yellow (10YR 7/6) loamy fine sand; common fine distinct yellowish red (5YR 4/6) masses of iron accumulation; single grained; very friable; common fine roots; common coarse pores; strong brown (7.5YR 5/8) discontinuous lamellae 0.2 to 2.0 centimeters thick make up combined thickness of 5 centimeters; common medium iron-manganese concretions; about 1 percent siliceous pebbles; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 2 to 10 percent
Redoximorphic features: None
Other distinctive soil features: Dry in the moisture control section 60 to 90 cumulative days in most years; rounded siliceous or ironstone pebbles range from few to 3 percent in most pedons; lamellae are at 40 to 72 inches deep
Concentrated minerals: None
Reaction: A or Ap horizon—strongly acid to slightly acid; E horizon (where present)—very strongly acid to slightly acid; Bw, Bw/E, and B&E horizons—extremely acid to slightly acid

A or Ap horizon:
Color—dark brown, brown, light brown, dark yellowish brown, yellowish brown, pale brown, or light yellowish brown
Redoximorphic features—none
Texture—fine sand
Other features—none

E horizon (where present):
Color—pale brown, light yellowish brown, or very pale brown
Redoximorphic features—none
Texture—fine sand or loamy fine sand
Other features—none

Bw horizon:
Color—yellowish red, reddish yellow, reddish pink, strong brown, yellowish brown, brownish yellow, or yellow
Redoximorphic features—none
Texture—fine sand or loamy fine sand
Other features—none

Bw/E and B&E horizons:
Color—yellowish red, reddish yellow, reddish pink, strong brown, yellowish brown, brownish yellow, or yellow (B); pale brown, light yellowish brown, or very pale brown (E)
Redoximorphic features—none
Texture—fine sand or loamy fine sand
Other features—lamellae in shades of brown or red with textures of loamy fine sand or fine sandy loam range from 0.1 to 2.5 centimeters thick with cumulative thickness less than 6 inches

Hallsbluff Series

Depth class: Very deep
Drainage class: Well drained

Figure 18.—Profile of Hainesville fine sand.

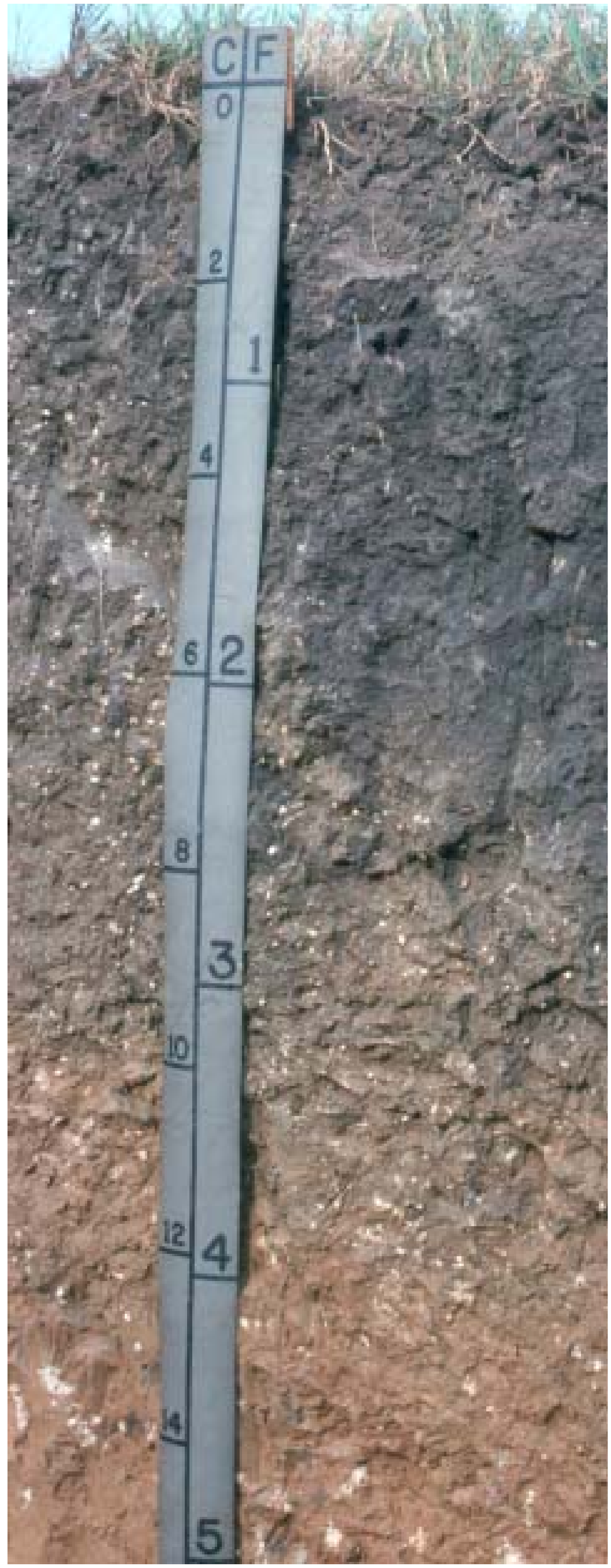


Figure 19.—Profile of Hallsbluff clay loam.

Permeability: Very slow
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Clayey alluvium from alkaline river and stream deposits
Slope range: 2 to 5 percent
Taxonomic class: Fine, smectitic, thermic Typic Hapluderts

Typical Pedon

Hallsbluff clay loam, in an area of Hallsbluff clay loam, 2 to 5 percent slopes (fig. 19), in a pasture; from the intersection of Loop 304 and Texas Highway 7 on west side of Crockett, 4.5 miles southwest on Texas Highway 7 to the intersection of Farm Road 132, 4.5 miles southwest on Farm Road 132 to end of pavement, 2.6 miles west on county road, 0.4 mile south of road:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) clay loam; moderate medium subangular blocky structure; very hard, very firm; many fine roots; few medium vesicular and tubular pores; many fine and medium worm casts; few fine concretions of calcium carbonate; few siliceous pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

A—6 to 17 inches; very dark grayish brown (10YR 3/2) silty clay; moderate medium angular blocky structure; very hard, very firm; common fine roots; few medium vesicular and tubular pores; few pressure faces; many fine and medium worm casts; few fine threads of calcium carbonate; few siliceous pebbles; very slightly effervescent; slightly alkaline; gradual wavy boundary.

Bss—17 to 29; very dark grayish brown (10YR 3/2) silty clay; common medium distinct light olive brown (2.5Y 5/4) relict redoximorphic concentrations; moderate medium angular blocky structure; very hard, very firm; few fine roots; many fine and medium vesicular and tubular pores; few fine and medium worm casts; common pressure faces and slickensides; few fine concretions of calcium carbonate; few siliceous pebbles; very slightly effervescent; slightly alkaline; clear wavy boundary.

Bkss1—29 to 40 inches; olive (5Y 5/3) clay; common fine distinct dark grayish brown (10YR 4/2) and few fine distinct very dark gray (10YR 3/1) relict iron depletions; moderate coarse angular blocky structure; very hard, very firm; common fine roots; many fine and medium vesicular and tubular pores; many pressure faces and slickensides with angles 40 to 50 degrees from horizontal; few fine and medium masses of iron-manganese; many fine and medium concretions of calcium carbonate; few siliceous pebbles; slightly effervescent; moderately alkaline; clear irregular boundary.

Bkss2—40 to 52 inches; light olive brown (2.5Y 5/4) clay; many fine distinct dark grayish brown (10YR 4/2) relict iron depletions; moderate coarse angular blocky structure parting to weak medium subangular blocky; very hard, very firm; common fine roots; many fine vesicular and tubular pores; common pressure faces; many slickensides; common medium concretions of calcium carbonate; few medium masses of iron-manganese; slightly effervescent; moderately alkaline; gradual wavy boundary.

BCss—52 to 80 inches; yellowish brown (10YR 5/8) clay; common fine and medium distinct light brownish gray (10YR 6/2) relict iron depletions; weak medium angular blocky structure; very hard, very firm; common fine roots; few fine and medium vesicular and tubular pores; common pressure faces and slickensides; few medium and coarse concretions of calcium carbonate; few medium masses of iron-manganese; slightly effervescent; moderately alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 45 to 60 percent
Redoximorphic features: Relict redoximorphic concentrations in shades of brown, yellow, or olive; relict iron depletions in shades of gray
Other distinctive soil features: There is gilgai microrelief unless cultivated; cracks range from 1/2 inch to about 2 inches wide and extend to a depth of more than 40 inches; cracks are open for 60 to 90 cumulative days during most years; intersecting slickensides begin at 12 to 22 inches deep
Concentrated minerals: Concretions, threads, and masses of calcium carbonate and gypsum crystals in the lower subsoil
Reaction: A or Ap and Bss horizons—slightly alkaline or moderately alkaline; Bkss and BCss horizons—moderately alkaline

A or Ap horizon:

Color—very dark gray, very dark grayish brown, or dark olive gray

Redoximorphic features—none to few relict redoximorphic concentrations in shades of brown in the lower part

Texture—clay loam in the upper part; clay loam or silty clay in the lower part

Other features—A horizons are dominantly calcareous, but some may be non-calcareous
Thickness—ranges from 6 inches on micro-knolls to 40 inches in micro-depressions; less than 12 inches thick in more than half of the pedon

Bss horizon:
Color—very dark grayish brown, dark grayish brown, dark olive gray, or olive gray
Redoximorphic features—relict redoximorphic concentrations in shades of brown, yellow, or olive range from none to common
Texture—silty clay or clay
Other features—none

Bkss horizon:
Color—very dark grayish brown, dark yellowish brown, dark brown, dark grayish brown, brown, light grayish brown, pale brown, light yellowish brown, brownish yellow, grayish brown, yellowish brown, dark olive gray, olive gray, olive, light olive gray, pale olive, olive yellow, light olive brown, or olive brown
Redoximorphic features—few or common relict redoximorphic concentrations in shades of brown, yellow, or olive
Texture—silty clay or clay
Other features—calcium carbonate threads, concretions, and masses range from 3 to 15 percent

BCss horizon:
Color—dark yellowish brown, yellowish brown, light yellowish brown, brownish yellow, olive, pale olive, olive yellow, light olive brown, or olive brown
Redoximorphic features—few or common relict redoximorphic concentrations in shades of brown or yellow and iron depletions in shades of gray
Texture—silty clay or clay
Other features—calcium carbonate concretions and masses range from about 1 to 10 percent; gypsum crystals are in the lower part in some pedons

Hannahatchee Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Flood plains
Parent material: Loamy alluvium from recent, reddish colored glauconitic stream deposits

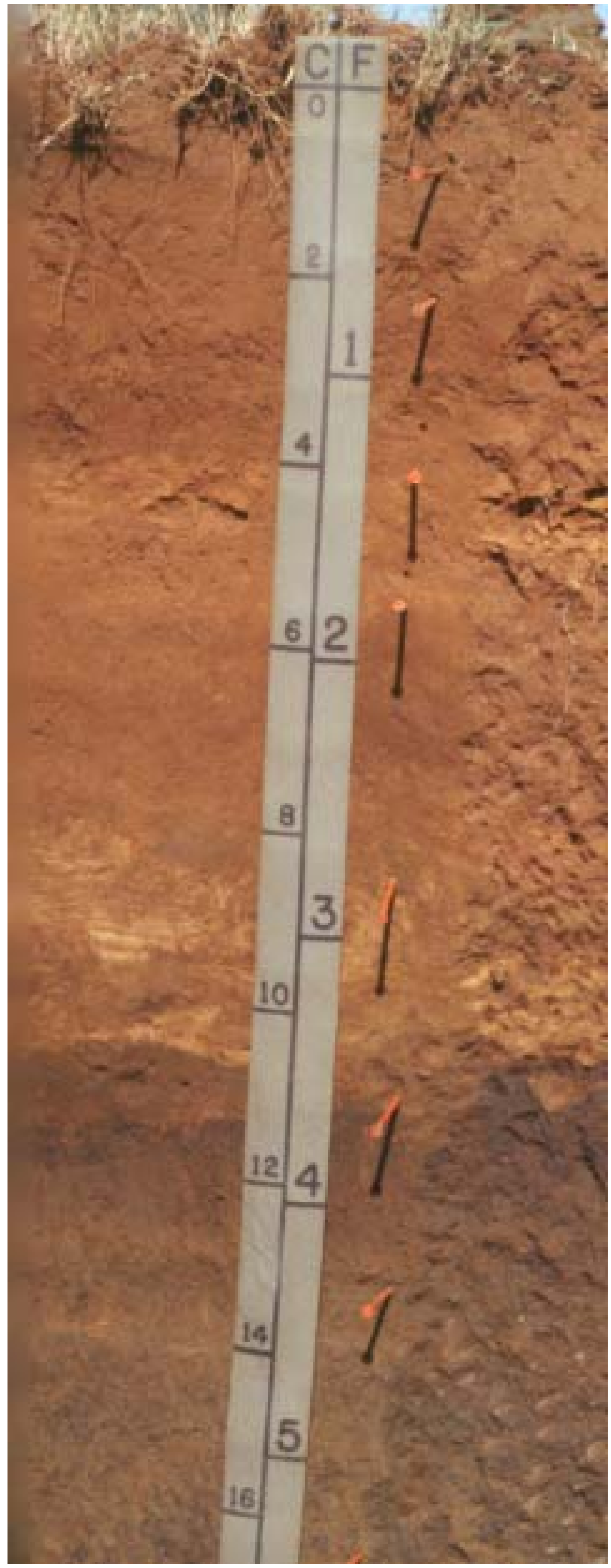


Figure 20.—Profile of Hannahatchee fine sandy loam.

Slope range: 0 to 1 percent
Taxonomic class: Fine-loamy, siliceous, thermic Dystric Fluventic Eutrochrepts

Typical Pedon

Hannahatchee fine sandy loam, in an area of Hannahatchee fine sandy loam, frequently flooded (fig. 20), in a pasture; from Crockett Loop 304, 15 miles north on U.S. Highway 287, 6.7 miles east on Farm Road 227, 2 miles southeast on county road, 0.5 mile southeast of road:

Ap—0 to 11 inches; dark yellowish brown (10YR 3/4) fine sandy loam; weak fine subangular blocky structure; soft, friable; common fine roots; few fine pores; slightly acid; clear wavy boundary.

A—11 to 23 inches; dark brown (10YR 3/4) loam; weak fine subangular blocky structure; soft, friable; common fine roots; few fine pores; slightly acid; clear smooth boundary.

Bw1—23 to 30 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate fine subangular blocky structure; slightly hard, friable; few fine roots; common fine pores; neutral; clear smooth boundary.

Bw2—30 to 39 inches; reddish brown (5YR 4/3) sandy clay loam; common medium distinct brown (10YR 4/3) mottles; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few fine roots; common fine pores; very few distinct yellowish brown patchy iron stains in roots channel; neutral; clear smooth boundary.

Bw3—39 to 63 inches; variegated strong brown (7.5YR 5/8), reddish brown (5YR 4/3), and dark brown (7.5YR 4/4) loam; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few fine roots; common fine pores; few distinct light brownish gray (10YR 6/2) continuous skeletans on ped faces; few yellowish red patchy iron stains in root channels; slightly acid; clear wavy boundary.

Bw4—63 to 76 inches; variegated yellowish red (5YR 5/6), grayish brown (10YR 5/2), and strong brown (7.5YR 5/6) sandy clay loam; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few fine and medium roots; common fine pores; few distinct yellowish red iron stains in root channels; strongly acid; clear wavy boundary.

Range in Characteristics

Solum thickness: More than 60 inches
Clay content in the control section: 18 to 28 percent
Redoximorphic features: Some pedons have light brownish gray, grayish brown, or gray iron depletions at more than 36 inches deep
Other distinctive soil features: Base saturation is 60 percent or more in some horizons at 10 to 30 inches deep
Concentrated minerals: Ironstone fragments and iron-manganese concretions range from none to common
Reaction: A or Ap horizon—strongly acid to slightly acid; Bw and C (where present) horizons—very strongly acid to neutral; Ab horizon (where present)—moderately acid to neutral

A or Ap horizon:
Color—reddish brown, yellowish red, dark brown, or brown
Redoximorphic features—none
Texture—fine sandy loam in the upper part; fine sandy loam or loam in the lower part
Other features—none
Thickness—less than 6 inches thick where color is dark brown

Bw horizon:
Color—dark reddish brown, dark yellowish brown, reddish brown, yellowish red, brown, or strong brown
Redoximorphic features—brown, dark grayish brown, dark yellowish brown, pale brown, red, dark reddish brown, strong brown, and reddish yellow redoximorphic concentrations are none to common; some pedons have light brownish gray, grayish brown, or gray iron depletions below 36 inches
Texture—sandy clay loam, fine sandy loam, very fine sandy loam, or loam with thin strata of loamy fine sand with thin layers having a clay content of 14 to 18 percent
Other features—none
Thickness—depth to a horizon containing more than 35 percent clay ranges from 40 to 60 inches; depth to the buried A horizon ranges from 45 to 60 inches

Ab horizon (where present):
Color—very dark gray, dark gray, very dark grayish brown, dark grayish brown, and dark brown
Redoximorphic features—brown, dark grayish brown, dark yellowish brown, pale brown, red, dark reddish brown, strong brown, and reddish yellow redoximorphic concentrations are none to common; some pedons have light brownish gray, grayish brown, or gray iron depletions below 36 inches

Texture—clay, clay loam, loam, or fine sandy loam
Other features—none

C horizon (where present):
Color—dark reddish brown, reddish brown, yellowish red, brown, or strong brown
Redoximorphic features—brown, dark grayish brown, dark yellowish brown, pale brown, red, dark reddish brown, strong brown, and reddish yellow redoximorphic concentrations are none to common; some pedons have light brownish gray, grayish brown, or gray iron depletions below 36 inches
Texture—sandy clay loam, fine sandy loam, very fine sandy loam, or loam with thin strata of loamy fine sand with thin layers having a clay content of 14 to 18 percent
Other features—none

Herty Series

Depth class: Deep
Drainage class: Well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from mudstone or shale
Slope range: 0 to 3 percent
Taxonomic class: Fine, smectitic, thermic Oxyaquic Vertic Hapludalfs

Typical Pedon

Herty loam, in an area of Herty loam, 1 to 3 percent slopes, in an area of woodland; 1.3 miles southwest of Kennard on Farm Road 2781, 0.4 mile west on U.S. Forest Service Road 595, 100 feet north of road:

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; soft, friable; many medium and coarse roots; moderately acid; clear smooth boundary.

E—3 to 10 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; many medium and coarse roots; slightly hard, friable; moderately acid; clear smooth boundary.

Bt—10 to 24 inches; very dark grayish brown (10YR 4/2) clay; moderate medium angular blocky structure; very hard, very firm; many fine, medium, and coarse roots; few pressure faces; few patchy clay films; strongly acid; gradual wavy boundary.

Btss—24 to 42 inches; dark grayish brown (10YR 4/2) clay; moderate medium angular blocky structure; very hard, very firm; common fine and medium roots; common slickensides; common clay films; strongly acid; gradual wavy boundary.

BCtss—42 to 45 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine distinct light yellowish brown (2.5Y 6/4) redoximorphic concentrations; weak fine subangular blocky structure; very hard, very firm; common slickensides; common clay films; about 3 percent gypsum crystals and masses; very strongly acid; gradual wavy boundary.

2Cy—45 to 80 inches; olive (5Y 5/3) mudstone with texture of clay loam; massive; very hard, very firm; 10 to 15 percent gypsum; few iron-manganese coatings; few fine roots; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 35 to 45 percent
Redoximorphic features: Few to common redoximorphic concentrations in the subsoil
Other distinctive soil features: During the summer and fall in most years, the soil has deep and wide cracks that extend at least 20 inches deep
Concentrated minerals: Exchangeable sodium ranges from 8 to 20 percent in the subsoil; sodium adsorption ratio ranges from 8 to 12; gypsum crystals or soft masses are in the lower part of the subsoil and substratum
Reaction: A and E horizons—very strongly acid to moderately acid; Bt, Btss, BCtss, and 2Cy horizons—strongly acid

A horizon:
Color—grayish brown, brown, dark grayish brown, very dark grayish brown, or dark brown
Redoximorphic features—none
Texture—loam
Other features—none

E horizon:
Color—light brownish gray, grayish brown, brown, light gray, pale brown, or gray
Redoximorphic features—none
Texture—loam or silt loam
Other features—none
Thickness—combined thickness of the A and E horizons is 3 to 10 inches

Bt horizon:
Color—dark gray, very dark gray, dark grayish brown, very dark grayish brown, brown, dark brown, or gray
Redoximorphic features—red, yellowish red, and strong brown redoximorphic concentrations are few or common

Texture—clay loam, clay, or silty clay
Other features—none

Btss and BCtss horizons:
Color—dark gray, very dark gray, dark grayish brown, very dark grayish brown, brown, dark brown, gray, light olive gray, and olive gray
Redoximorphic features—red, yellowish red, and strong brown redoximorphic concentrations are few or common
Texture—clay or silty clay
Other features—soft masses or large crystals of gypsum; few or common slickensides

2Cy horizon:
Color—shades of olive or gray
Redoximorphic features—none
Texture—mudstone, shale, or partially weathered shale with texture of clay or clay loam
Other features—gypsum crystals are present in most pedons

Iulus Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Flood plains
Parent material: Loamy alluvium from recent river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Fluvaquentic Dystrochrepts

Typical Pedon

Iulus fine sandy loam, in an area of Iulus fine sandy loam, frequently flooded, in an area of woodland; from Loop 304 and Texas Highway 21 in Crockett, 23 miles east on Texas Highway 21 to U.S. Forest Service Road 511, 4 miles south on U.S. Forest Service Road 511, 1.5 miles west of U.S. Forest Service Road 511 on U.S. Forest Service Road 526, 100 feet north of road:

A—0 to 7 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; slightly hard, very friable; many fine and medium roots; common fine pores; few worm casts; strongly acid; gradual smooth boundary.

Bw—7 to 14 inches; yellowish brown (10YR 5/6) fine sandy loam; moderate fine subangular structure; slightly hard, very friable; common fine and medium roots; common very fine and fine pores; strongly acid; clear smooth boundary.

Ab1—14 to 22 inches; brown (10YR 4/3) loam; few fine distinct light brownish gray (10YR 6/2) iron depletions and yellowish red (5YR 4/6) redoximorphic concentrations; moderate medium subangular blocky structure; slightly hard, friable; common fine roots; few fine pores; strongly acid; gradual smooth boundary.

Ab2—22 to 27 inches; dark grayish brown (10YR 4/2) loam; few fine distinct light brownish gray (10YR 6/2) iron depletions and prominent yellowish red (5YR 4/6) redoximorphic concentrations; moderate medium subangular blocky structure; slightly hard, friable; common fine roots; common fine pores; strongly acid; gradual smooth boundary.

Bwb1—27 to 40 inches; variegated yellowish brown (10YR 5/4), dark grayish brown (10YR 4/2), and light brownish gray (10YR 6/2) fine sandy loam; few thin strata of light gray (10YR 7/2) loamy fine sand; weak medium subangular blocky structure; slightly hard, friable; common fine roots; few fine pores; strongly acid; gradual smooth boundary.

Bwb2—40 to 65 inches; brown (10YR 5/3) fine sandy loam; few thin strata of light gray (10YR 7/2) loamy fine sand; common medium prominent brown (7.5YR 4/4) redoximorphic concentrations; weak medium subangular blocky structure; slightly hard, friable; common fine roots; few fine pores; very strongly acid; gradual smooth boundary.

Bwb3—65 to 70 inches; brown (10YR 5/3) loam; few thin strata of light gray (10YR 7/2) loamy fine sand; common medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; few fine pores; very strongly acid; gradual smooth boundary.

Bwb4—70 to 82 inches; variegated dark grayish brown (10YR 4/2), yellowish brown (10YR 5/6), and grayish brown (10YR 5/2) sandy clay loam; moderate medium subangular blocky structure; hard, friable; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 10 to 18 percent
Redoximorphic features: Redoximorphic concentrations in shades of brown, yellow, or red and iron depletions in shades of gray begin at less than 24 inches deep
Other distinctive soil features: Dry in some parts of the moisture control section for more than 60 cumulative days in most years

Concentrated minerals: None
Reaction: Very strongly acid to moderately acid throughout

A horizon:
Color—dark brown, very dark grayish brown, dark grayish brown, dark yellowish brown, brown, grayish brown, or yellowish brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

Bw horizon:
Color—dark brown, strong brown, brown, dark yellowish brown, or yellowish brown
Redoximorphic features—few to many iron accumulations in shades of brown, yellow, or red and iron depletions in shades of gray are at less than 24 inches deep; in some pedons, the horizon is variegated in these colors
Texture—fine sandy loam or loam in the upper part; fine sandy loam, loam, or sandy clay loam in the lower part
Other features—some pedons have thin layers of silt loam or very fine sandy loam

Ab horizon:
Color—dark brown, very dark grayish brown, dark grayish brown, dark yellowish brown, brown, grayish brown, or yellowish brown
Redoximorphic features—iron accumulations in shades brown; iron depletions in shades of gray
Texture—fine sandy loam
Other features—none

Bg horizon (where present):
Color—shades of brown or gray with chroma of 2 or less
Redoximorphic features—depleted matrix with few to many redoximorphic concentrations in shades of brown, yellow, or red
Texture—fine sandy loam, very fine sandy loam, loam, silt loam, or sandy clay loam; most pedons have more than one texture and some pedons have thin strata of loamy fine sand
Other features—none

Kaufman Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Flood plains
Parent material: Clayey alluvium from recent river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Very-fine, smectitic, thermic Typic Hapluderts

Typical Pedon

Kaufman clay, in an area of Kaufman clay, occasionally flooded, in a cotton field; about 3 miles southwest of Mapleton on Texas Highway 21 to 7-J Ranch headquarters, 0.3 mile east along a gravel road, 0.5 mile south of road:

Ap—0 to 3 inches; very dark gray (10YR 3/1) clay; moderate medium subangular blocky structure; very hard, very firm; common fine and medium roots; few worm casts; moderately acid; clear wavy boundary.
A—3 to 14 inches; very dark gray (10YR 2/1) clay; moderate medium subangular blocky structure; very hard, very firm; common fine and medium roots; few slickensides; moderately acid; gradual wavy boundary.
Bss1—14 to 25 inches; dark gray (10YR 2/1) clay; common medium prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; moderate medium angular blocky structure; extremely hard, very firm; common fine and medium roots; common slickensides; slightly acid; gradual wavy boundary.
Bss2—25 to 45 inches; dark gray (10YR 3/1) clay; many medium prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; moderate medium angular blocky structure; extremely hard, very firm; common fine roots; common slickensides; slightly acid; gradual wavy boundary.
Bss3—45 to 62 inches; gray (10YR 5/1) clay; many medium prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; moderate medium angular blocky structure; extremely hard, very firm; common fine roots; common slickensides; neutral; gradual wavy boundary.
Bssy1—62 to 73 inches; grayish brown (2.5Y 5/2) clay; common medium distinct light olive brown (2.5Y 5/6) redoximorphic concentrations; moderate medium angular blocky structure; extremely hard, very firm; few fine roots; common slickensides; common gypsum concretions; moderately alkaline; gradual wavy boundary.
Bssy2—73 to 90 inches; gray (10YR 5/1) clay; common medium prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; moderate medium subangular blocky structure;

extremely hard, very firm; few fine roots; common slickensides; few gypsum concretions; moderately alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 60 to 86 percent
Redoximorphic features: Redoximorphic concentrations in shades of brown, yellow, or olive range from none to common
Other distinctive soil features: Undisturbed areas have subdued gilgai microrelief; cracks 1 inch to 3 inches wide extend from the surface to a depth of more than 40 inches and remain open for 60 to 90 cumulative days during most years; intersecting slickensides are at more than 10 inches deep
Concentrated minerals: Some pedons are calcareous below a depth of 24 inches; soft masses or crystals of gypsum are in the lower part of the solum
Reaction: Moderately acid to moderately alkaline throughout

A or Ap horizon:
Color—black or very dark gray
Redoximorphic features—some pedons have redoximorphic concentrations in shades of brown, yellow, or olive in the lower part
Texture—clay
Other features—none

Bss horizon and Bssg horizon (where present):
Color—black, very dark gray, dark gray, grayish brown, or gray; in some pedons, the matrix is more gray below a depth of 40 inches
Redoximorphic features—iron accumulations in shades of brown, yellow, or olive range from none to common
Texture—clay
Other features—few or common slickensides

Bssy horizon:
Color—black, very dark gray, dark gray, grayish brown, or gray; in some pedons, the matrix is more gray below a depth of 40 inches
Redoximorphic features—iron accumulations in shades of brown, yellow, or olive range from none to common
Texture—clay
Other features—few or common slickensides and soft masses or crystals of gypsum

Kellison Series

Depth class: Deep
Drainage class: Well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from shale or mudstone
Slope range: 5 to 15 percent
Taxonomic class: Fine, smectitic, thermic Vertic Hapludalfs

Typical Pedon

Kellison loam, in an area of Kellison loam, 5 to 15 percent slopes, in an area of woodland; from the intersection Texas Highway 7 and Farm Road 357 in Kennard, about 4.75 miles east on Farm Road 357, about 2.7 miles east on U.S. Forest Service Road 527, about 0.2 mile south along woods road, about 50 feet east of road:

A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; slightly hard, friable; common fine and medium roots; moderately acid; clear smooth boundary.
E—3 to 7 inches; pale brown (10YR 6/3) loam; weak medium subangular blocky structure; slightly hard, friable; common fine and medium roots; moderately acid; abrupt smooth boundary.
Bt—7 to 22 inches; light brownish gray (10YR 6/2) clay; common medium distinct yellowish brown (10YR 5/4) relict redoximorphic concentrations and grayish brown (2.5Y 5/2) relict iron depletions; weak medium subangular blocky structure; very hard, very firm; common fine and medium roots; few pressure faces; few patchy clay films; strongly acid; gradual wavy boundary.
Btss1—22 to 30 inches; light brownish gray (2.5Y 6/2) clay; common fine faint grayish brown (10YR 5/2) relict iron depletions and distinct yellowish brown (10YR 5/4) relict redoximorphic concentrations; moderate medium angular blocky structure; very hard, very firm; common fine roots; common slickensides; few thin clay films; strongly acid; gradual wavy boundary.
Btss2—30 to 39 inches; light brownish gray (2.5Y 6/2) clay; common fine faint light yellowish brown (2.5Y 6/4) relict redoximorphic concentrations; moderate medium angular blocky structure; very hard, very firm; common fine roots; common slickensides; few thin clay films; very strongly acid; gradual wavy boundary.
BCtss—39 to 47 inches; light yellowish brown (2.5Y 6/4) clay; common fine faint light brownish gray

(2.5Y 6/2) relict iron depletions; moderate fine angular blocky structure; very hard, very firm; few fine roots; common slickensides; few thin clay films; very strongly acid; gradual wavy boundary.

C—47 to 65 inches; interbedded olive (5Y 5/3) and gray (5Y 6/1) shale with clay texture; weak coarse platy rock structure parting to weak medium angular fragments; very hard, very firm; few iron-manganese coatings between plates; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 45 to 60 percent
Redoximorphic features: Relict or lithochromic iron concentrations and depletions are in the subsoil
Other distinctive soil features: Cracks extend from the surface to a depth of 12 inches or more for 60 to 80 days during most years; slickensides begin at 12 to 24 inches deep
Concentrated minerals: Sodium adsorption ratio ranges from 2 to 9 in the upper part of the subsoil and from 2 to 13 in the lower part of the subsoil and in the substratum and commonly increases with depth
Reaction: A and E horizons—very strongly acid to moderately acid; Bt, Btss, and BCtss horizons—extremely acid to strongly acid; C horizon—very strongly acid to neutral

A horizon:
Color—very dark grayish brown, dark brown, dark grayish brown, brown, or grayish brown
Redoximorphic features—none
Texture—loam
Other features—none

E horizon:
Color—gray, grayish brown, brown, light brownish gray, or pale brown
Redoximorphic features—none
Texture—very fine sandy loam or loam
Other features—none
Thickness—combined thickness of the A and E horizons is 3 to 10 inches

Bt horizon:
Color—very dark gray, very dark grayish brown, dark brown, dark gray, dark grayish brown, brown, gray, grayish brown, light gray, or light brownish gray
Redoximorphic features—few or common relict iron accumulations in shades of red or brown
Texture—clay loam, silty clay, or clay
Other features—sodium adsorption ratio ranges from 2 to 9 in the upper part and from 2 to 12 in the lower part

Btss and BCtss horizons:
Color—very dark gray, very dark grayish brown, dark olive gray, olive gray, dark brown, dark gray, dark grayish brown, brown, gray, grayish brown, light olive gray, light gray, or light brownish gray
Redoximorphic features—few to common relict iron accumulations in shades of red or brown
Texture—silty clay or clay
Other features—masses and/or crystals of gypsum, mainly in the lower part, range from none to common

C horizon:
Color—very dark gray, very dark grayish brown, dark gray, dark grayish brown, grayish brown, gray, or light gray
Redoximorphic features—none
Texture—shale or shale interbedded with mudstone with texture of clay loam or clay
Other features—masses and/or crystals of gypsum range from few to many in most pedons; sodium adsorption ratio ranges from 2 to 13

Keltys Series

Depth class: Deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Uplands
Parent material: Loamy marine sediments over mudstone
Slope range: 1 to 8 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Typic Glossudalfs

Typical Pedon

Keltys fine sandy loam, in an area of Keltys fine sandy loam, 1 to 3 percent slopes, in an area of woodland; 4 miles east on Texas Highway 7 from Ratcliff, 2.4 miles south on Enon Cemetery Road, 100 feet west of road:

A—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; soft, very friable; common fine and medium roots; common fine pores; strongly acid; clear smooth boundary.

E1—6 to 11 inches; brown (10YR 5/3) fine sandy loam; weak fine and medium subangular blocky

structure; soft, very friable; common fine and medium roots; common fine pores; strongly acid; gradual wavy boundary.

E2—11 to 18 inches; very pale brown (10YR 7/3) fine sandy loam; common fine distinct yellowish brown (10YR 5/8) masses of iron accumulation and few medium faint light brownish gray (10YR 6/2) iron depletions; weak fine subangular blocky structure; slightly hard, friable; common fine and medium roots; common medium pores; strongly acid; abrupt wavy boundary.

Bt/E—18 to 25 inches; yellowish brown (10YR 5/4) fine sandy loam; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; weak fine prismatic structure; slightly hard, very friable; common medium roots; common medium pores; few clay films; about 30 to 40 percent albic material (E); very strongly acid; gradual smooth boundary.

E/Bt1—25 to 33 inches; light brownish gray (10YR 6/2) fine sandy loam; about 30 to 40 percent yellowish brown (10YR 5/8) loam (Bt); weak fine and medium prismatic structure; slightly hard, friable; common fine and medium roots; few fine pores; few thin grayish brown (10YR 5/2) clay films; about 15 percent massive brittle bodies; very strongly acid; gradual smooth boundary.

E/Bt2—33 to 50 inches; light brownish gray (10YR 6/2) loam; about 30 to 40 percent yellowish brown (10YR 5/6) loam (Bt); weak coarse prismatic structure; slightly hard, friable; common fine and medium roots; few fine pores; few thin grayish brown (10YR 5/2) clay films; common dark grayish brown crayfish burrows; very strongly acid; clear irregular boundary.

Bt/E—50 to 57 inches; olive brown (2.5Y 4/4) clay loam; many medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; moderate medium and coarse prismatic structure parting to weak medium subangular blocky; hard, very firm; few fine roots; few fine pores; few clay films; few fine and medium barite segregations; about 5 percent albic material (E); very strongly acid; gradual irregular boundary.

C/Bt—57 to 63 inches; pale olive (5Y 6/3) clay loam; common medium faint olive brown (2.5Y 4/4) and distinct brownish yellow (10YR 6/8) masses of iron accumulation (Bt); weak very coarse prismatic structure; hard, very firm; few fine roots; few dark grayish brown (10YR 4/2) clay films on ped faces; few fine and medium barite segregations; common clay cups lining crayfish burrows; few concretions 2 to 3 millimeters in diameter; very strongly acid; gradual irregular boundary.

2C—63 to 80 inches; light brownish gray (2.5Y 6/2) mudstone with texture of clay loam; common medium prominent yellowish brown (10YR 5/8) lithochromic mottles; very hard, very firm; few roots along bedding planes; few fine and medium barite segregations; few brown clay films along bedding planes; extremely acid.

Range in Characteristics

Solum thickness: 40 to 60 inches

Clay content in the control section: 8 to 18 percent

Redoximorphic features: Redoximorphic concentrations in shades of brown; iron depletions in shades of gray

Other distinctive soil features: Silt content in the particle-size control section ranges from 15 to 30 percent

Concentrated minerals: None

Reaction: A horizon—strongly acid to slightly acid; E horizon—strongly acid or moderately acid; Bt/E, E/Bt, and C/Bt horizons—very strongly acid or strongly acid; 2C horizon—extremely acid to strongly acid

A horizon:

Color—dark brown, very dark grayish brown, dark grayish brown, or brown

Redoximorphic features—none

Texture—fine sandy loam

Other features—none

E horizon:

Color—brown, grayish brown, pale brown, very pale brown, light gray, or light brownish gray

Redoximorphic features—few or common redoximorphic concentrations in shades of brown and iron depletions in shades of gray in the lower part

Texture—fine sandy loam or loamy very fine sand

Other features—none

Thickness—combined thickness of the A and E horizons ranges from 15 to 35 inches

Bt/E and E/Bt horizons:

Color—variegated dark yellowish brown, yellowish brown, brownish yellow, yellow, strong brown, reddish yellow, yellowish red, reddish pink, gray, light gray, red, or light red

Redoximorphic features—iron accumulations in shades of brown or yellow

Texture—fine sandy loam in the upper part; fine sandy loam, loam, or clay loam in the lower part

Other features—streaks and pockets of albic material (E) contain less clay and occupy 20 to 50 percent of the volume; typically the volume increases with depth

C/Bt horizon:

Color—shades of brown and olive
Redoximorphic features—iron accumulations in shades of brown or yellow
Texture—clay loam
Other features—none

2C horizon:

Redoximorphic features—none
Texture—weakly consolidated mudstone with texture of clay loam to clay; some pedons contain layers of sandstone
Other features—none

Kirvin Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from stratified sandstone and shale
Slope range: 2 to 8 percent
Taxonomic class: Clayey, mixed, thermic Typic Hapludults

Typical Pedon

Kirvin fine sandy loam, in an area of Kirvin fine sandy loam, 2 to 5 percent slopes, in an area of woodland; from Loop 304 in Crockett, 6.7 miles northwest on Farm Road 229, 1.4 miles southwest on woods road, 75 feet east of road:

A—0 to 5 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; soft, very friable; many fine roots; about 2 to 3 percent ironstone pebbles; slightly acid; clear smooth boundary.

E—5 to 11 inches; very pale brown (10YR 7/3) fine sandy loam; weak fine granular structure; soft, very friable; few fine roots; slightly acid; clear wavy boundary.

Bt1—11 to 23 inches; dark red (2.5YR 3/6) clay; moderate medium angular blocky structure; hard, firm; common fine roots; thick continuous clay films; very strongly acid; gradual wavy boundary.

Bt2—23 to 46 inches; red (2.5YR 4/8) clay; common medium prominent yellowish brown (10YR 5/8) lithochromic mottles; moderate medium angular blocky structure; hard, firm; common fine roots; thick continuous clay films; very strongly acid; gradual wavy boundary.

Bt/C—46 to 56 inches; red (2.5YR 4/8) sandy clay; common medium prominent yellowish brown (10YR 5/8) and few medium prominent dark red (10R 3/6) lithochromic mottles; weak medium subangular blocky structure; hard, firm; few fine roots; red clay flows between peds; about 20 percent horizontal gray shale fragments (C); few flakes of mica; very strongly acid; clear wavy boundary.

C—56 to 74 inches; stratified red (2.5YR 5/8) sandstone with texture of sandy clay loam and grayish brown (10YR 5/2) shale with texture of clay; massive; hard, firm; few fine roots; few flakes of mica; very strongly acid; abrupt wavy boundary.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 35 to 60 percent
Redoximorphic features: None
Other distinctive soil features: Ironstone fragments ranging from less than 1 inch to 3 inches across the long axis cover less than 1 percent of the surface area
Concentrated minerals: None
Reaction: A and E horizons—strongly acid to neutral; Bt horizon—extremely acid to strongly acid; BCt (where present), Bt/C, and C horizons—extremely acid or very strongly acid

A horizon (where present):

Color—dark brown, brown, dark grayish brown, very dark grayish brown, dark yellowish brown, or yellowish brown; some pedons are yellowish red
Redoximorphic features—none
Texture—fine sandy loam, gravelly fine sandy loam, or clay loam
Other features—ironstone fragments ranging from less than 1 inch to 3 inches across the long axis make up from 1 to 35 percent of the volume; in graded areas, the surface layer has been removed

E horizon:

Color—yellowish brown, light yellowish brown, brown, light brown, or pale brown
Redoximorphic features—none
Texture—fine sandy loam, very fine sandy loam, or their gravelly analogues
Other features—in graded areas, the horizon may have been removed

Bt horizon:

Color—red, dark reddish brown, dark red, reddish brown, or yellowish red
Redoximorphic features—none
Texture—clay, sandy clay, or clay loam
Other features—grayish, platy shale fragments are in the lower part in some pedons

BCt horizon (where present) and Bt/C horizon:

Color—Shades of yellow, red, or brown
Redoximorphic features—none
Texture—sandy clay loam, clay loam, or clay
Other features—thin strata and fragments of sandstone or shale range from none to common; few or common clay films between peds

C horizon:

Color—loamy materials and sandstone strata are reddish, yellowish, or brownish; shale strata are grayish colors
Redoximorphic features—none
Texture—stratified, weakly consolidated sandstone and/or shale with texture of sandy clay loam to clay
Other features—a few mica flakes are present in most pedons, typically between plates of shale; most pedons have a few clay flows along some vertical fractures

Kosse Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Flood plains
Parent material: Loamy alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Fine-loamy, mixed, thermic Fluventic Hapludolls

Typical Pedon

Kosse sandy clay loam, in an area of Kosse sandy clay loam, occasionally flooded, in a pasture; from Loop 304 west, 19.7 miles west on Texas Highway 21 to 7-J Ranch gate (east of headquarters), 0.76 mile northwest of gate:

Ap—0 to 15 inches; very dark gray (10YR 3/1) sandy clay loam; moderate fine subangular blocky structure; slightly hard, friable; many fine and medium roots; many fine pores; common brown (10YR 5/3) worm casts; slightly acid; clear wavy boundary.

Bw1—15 to 23 inches; dark grayish brown (10YR 4/2) sandy clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable; many fine and medium roots; many fine pores; few patchy faint very dark gray (10YR 3/1) organic films on surface of prisms; common pale brown (10YR 6/3) worm casts; neutral; gradual wavy boundary.

Bw2—23 to 32 inches; dark gray (10YR 4/1) sandy clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable; many fine and medium roots; many fine pores; few patchy faint very dark gray (10YR 3/1) organic films on surface of prisms; common light yellowish brown (10YR 6/4) worm casts; slightly alkaline; clear wavy boundary.

Bw3—32 to 44 inches; light yellowish brown (2.5Y 6/4) sandy clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable; common fine and medium roots; many fine pores; few patchy distinct dark gray (10YR 4/1) organic films on surface of prisms; few fine calcium carbonate concretions; slightly alkaline; gradual wavy boundary.

Bk1—44 to 62 inches; pale yellow (2.5Y 7/4) loam; weak fine prismatic structure parting to moderate medium subangular blocky; hard, friable; common fine roots; many fine pores; common medium distinct light brownish gray (10YR 6/2) iron depletions and distinct yellowish brown (10YR 5/4) redoximorphic concentrations; few patchy distinct dark gray (10YR 4/1) organic films on surface of peds; about 20 percent calcium carbonate concretions and masses; calcium carbonate equivalent is 22 percent; common iron-manganese masses in clusters; slightly effervescent; slightly alkaline; gradual wavy boundary.

Bk2—62 to 80 inches; brownish yellow (10YR 6/8) loam; weak fine prismatic structure parting to weak fine subangular blocky; hard, friable; common fine roots; common fine pores; common medium distinct light brownish gray (10YR 6/2) iron depletions; few patchy distinct dark gray (10YR 4/1) organic films on surface of peds; about 30 percent calcium carbonate concretions and masses; calcium carbonate equivalent is 28 percent; common iron-manganese masses in clusters; strongly effervescent; slightly alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 20 to 35 percent
Redoximorphic features: None to common iron depletions in shades of gray and redoximorphic concentrations in shades of brown or yellow in the lower part of the solum
Other distinctive soil features: Organic carbon content ranges from 0.3 to 0.5 percent at a depth 50 inches below the mineral soil surface and/or there is an irregular decrease in organic carbon content at 20 to 50 inches deep
Concentrated minerals: Common or many calcium carbonate masses and concretions
Reaction: A or Ap and Bw horizons—slightly acid to slightly alkaline; Bk horizon—neutral to moderately alkaline

A or Ap horizon:
Color—very dark grayish brown, very dark gray, dark brown, or very dark brown
Redoximorphic features—none
Texture—sandy clay loam
Other features—none
Thickness—10 to 20 inches

Ab horizon (where present):
Color—very dark grayish brown, very dark gray, dark brown, or very dark brown
Redoximorphic features—none
Texture—sandy clay loam
Other features—buried A horizon is at 30 to 60 inches deep in some pedons

Upper part of the Bw horizon:
Color—black, brown, gray, dark gray, dark grayish brown, or dark brown
Redoximorphic features—none
Texture—sandy clay loam or clay loam
Other features—thin discontinuous bedding planes of loamy, clayey, and/or sandy materials are few or common in some pedons; however, they make up less than 30 percent of any subhorizon

Lower part of the Bw horizon:
Color—dark grayish brown, brown, dark yellowish brown, grayish brown, yellowish brown, light brownish gray, pale brown, light yellowish brown, brownish yellow, very pale brown, yellow, or olive yellow
Redoximorphic features—none to common iron depletions in shades of gray and redoximorphic concentrations in shades of brown or yellow
Texture—sandy clay loam or clay loam
Other features—none to few calcium carbonate masses and concretions; thin discontinuous bedding planes of loamy, clayey, and/or sandy materials are few or common in some pedons; however, they make up less than 30 percent of any subhorizon

Bk horizon:
Color—grayish brown, brown, yellowish brown, light brownish gray, pale brown, light yellowish brown, brownish yellow, light gray, very pale brown, yellow, olive yellow, or pale yellow
Redoximorphic features—none to common iron depletions in shades of gray and redoximorphic concentrations in shades of brown
Texture—fine sandy loam, loam, or sandy clay loam
Other features—common or many calcium carbonate masses and concretions

Koury Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Flood plains
Parent material: Loamy alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Coarse-silty, siliceous, thermic Dystric Fluventic Eutrochrepts

Typical Pedon

Koury silt loam, in an area of Koury silt loam, frequently flooded, in an area of woodland; from Loop 304 and Texas Highway 21 in Crockett, 7.6 miles east on Texas Highway 21 to Berea Community, 4.25 miles south along Farm Road 232, 800 feet east of Farm Road 232 on logging lane, 25 feet northeast of lane:

A1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; slightly hard, friable; common fine and medium roots; strongly acid; gradual wavy boundary.
A2—3 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure; slightly hard, friable; common fine and medium roots; strongly acid; gradual wavy boundary.
Bw1—9 to 18 inches; brown (10YR 5/3) silt loam; few fine faint grayish brown (10YR 5/2) strippings and distinct yellowish brown (10YR 5/6) masses of iron accumulation; weak medium subangular blocky structure; slightly hard, friable; common

fine roots; very strongly acid; gradual wavy boundary.

Bw2—18 to 30 inches; brown (10YR 5/3) silt loam; dark brown (10YR 4/3) stains; few fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; weak medium subangular blocky structure; slightly hard, friable; common fine roots; very strongly acid; gradual wavy boundary.

Bg—30 to 54 inches; grayish brown (10YR 5/2) loam; common fine faint dark yellowish brown (10YR 4/4) masses of iron accumulation and few fine faint light gray (10YR 7/1) iron depletions; weak fine subangular blocky structure; slightly hard, friable; few fine roots; very strongly acid; clear smooth boundary.

Bw´1—54 to 62 inches; brown (10YR 5/3) very fine sandy loam; few fine distinct grayish brown (10YR 5/2) iron depletions; weak medium subangular blocky structure; hard, firm; few fine roots; strongly acid; gradual smooth boundary.

Bw´2—62 to 80 inches; brown (10YR 5/3) loam; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation and few fine distinct light brownish gray (10YR 6/2) iron depletions; weak fine subangular blocky structure; hard, firm; few fine roots; slightly acid; clear smooth boundary.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 8 to 18 percent
Redoximorphic features: Depleted matrix in the lower part of the solum with few or common redoximorphic concentrations in shades of red, yellow, or brown
Other distinctive soil features: None
Concentrated minerals: Aluminum saturation ranges from 50 to 85 percent in the upper 40 inches; electrical conductivity ranges from 0 to 2 mmhos/cm throughout
Reaction: Extremely acid to moderately acid throughout

A horizon:
Color—dark grayish brown, dark brown, dark yellowish brown, grayish brown, brown, yellowish brown, or pale brown
Redoximorphic features—none
Texture—silt loam
Other features—electrical conductivity ranges from 0 to 2 mmhos/cm

Bw and Bw´ horizons:
Color—dark brown, brown, dark yellowish brown, yellowish brown, pale brown, light yellowish brown, dark grayish brown, very dark gray, olive brown, light olive brown, or light yellowish brown
Redoximorphic features—few or common iron accumulations in shades of red, yellow, or brown and iron depletions in shades of gray
Texture—very fine sandy loam, loam, or silt loam
Other features—electrical conductivity ranges from 0 to 2 mmhos/cm

Bg horizon:
Color—grayish brown, light brownish gray, or light gray
Redoximorphic features—depleted matrix with few or common redoximorphic concentrations in shades of red, yellow, or brown
Texture—loam, silt loam, sandy clay loam, or clay loam
Other features—electrical conductivity ranges from 0 to 2 mmhos/cm

Kurth Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Loamy marine sediments
Slope range: 1 to 8 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Glossudalfs

Typical Pedon

Kurth fine sandy loam, in an area of Kurth fine sandy loam, 1 to 3 percent slopes, in an area of woodland; 2.5 miles east on Texas Highway 7 from Ratcliff, 1.3 miles south on U.S. Forest Service Road 562, 0.1 mile east on a lane, 0.1 mile southeast on intersecting lane, 50 feet east of lane:

A—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine subangular blocky structure; loose, very friable; many medium and coarse roots; few fine pores; strongly acid; clear smooth boundary.

E1—6 to 11 inches; pale brown (10YR 6/3) fine sandy loam; weak fine and medium subangular blocky structure; loose, very friable; common fine roots; few fine pores; strongly acid; gradual wavy boundary.

E2—11 to 20 inches; light yellowish brown (10YR 6/4) fine sandy loam; massive; slightly hard, very friable; few fine roots; few fine pores; few siliceous pebbles and petrified wood fragments; strongly acid; clear wavy boundary.

Bt/E1—20 to 28 inches; brownish yellow (10YR 6/6)

sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and few medium prominent red (2.5YR 5/8) masses of iron accumulation; moderate fine and medium angular blocky structure; slightly hard, friable; common fine and medium roots; few fine pores; few clay films on ped faces; about 25 percent albic material (E); few siliceous pebbles and petrified wood fragments; very strongly acid; clear wavy boundary.

Bt/E2—28 to 40 inches; strong brown (7.5YR 5/8) sandy clay loam; many coarse prominent dark red (2.5YR 3/6) redoximorphic concentrations and few fine prominent light brownish gray (10YR 6/2) iron depletions; moderate medium angular blocky structure; hard, firm; few fine roots; few fine pores; few clay films on ped faces; about 10 percent albic material (E); common fine ironstone pebbles; very strongly acid; gradual wavy boundary.

2Bt1—40 to 49 inches; light brownish gray (10YR 6/2) clay loam; many coarse prominent dark red (2.5YR 3/6) and few fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm; few fine and medium roots; few fine pores; common clay films; few fine ironstone pebbles; very strongly acid; gradual wavy boundary.

2Bt2—49 to 65 inches; light brownish gray (10YR 6/2) clay loam; many coarse prominent dark red (2.5YR 3/6) and few fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm; few fine and medium roots; few fine pores; few clay films; very strongly acid; gradual wavy boundary.

2C—65 to 80 inches; grayish brown (2.5Y 5/2) mudstone with texture of clay loam; few medium distinct light brownish gray (10YR 6/2) iron depletions and common medium prominent dark red (2.5YR 3/6) redoximorphic concentrations; massive; very hard, very firm; few fine and medium roots on vertical faces; very strongly acid.

Range in Characteristics

Solum thickness: 60 to 80 inches

Clay content in the control section: 18 to 30 percent

Redoximorphic features: Iron depletions and accumulations throughout the subsoil

Other distinctive soil features: Silt content ranges from 15 to 30 percent in the particle-size control section

Concentrated minerals: Electrical conductivity ranges from 0.5 to 2.0 mmhos/cm in the substratum

Reaction: A horizon—strongly acid to slightly acid; E and Bt/E horizons—strongly acid or moderately acid; 2Bt and 2C horizons—extremely acid to strongly acid

A horizon:

Color—Brown, dark brown, grayish brown, dark grayish brown, or very dark grayish brown

Redoximorphic features—none

Texture—fine sandy loam

Other features—none

E horizon:

Color—Brown, grayish brown, light brownish gray, pale brown, very pale brown, yellowish brown, or light yellowish brown

Redoximorphic features—none

Texture—fine sandy loam

Other features—none

Thickness—combined thickness of the A and E horizons ranges from 16 to 30 inches

Bt/E horizon:

Color—dark yellowish brown, yellowish brown, brownish yellow, yellow, strong brown, reddish yellow, yellowish red, or red

Redoximorphic features—iron depletions and accumulations

Texture—fine sandy loam or sandy clay loam

Other features—albic material (E) make up 10 to 40 percent, but some subhorizons have 15 percent or more

2Bt horizon:

Color—gray, grayish brown, light brownish gray, or light gray

Redoximorphic features—few to many redoximorphic concentrations in shades of red or brown

Texture—clay loam

Other features—none

2C horizon:

Color—shades of brown or gray with strata, streaks, or masses with these colors and shades of yellow or red

Redoximorphic features—none

Texture—weakly consolidated sandstone or mudstone with texture of fine sandy loam or sandy clay loam or the horizon is stratified with these materials; some pedons contain layers of shale and or/siltstone

Other features—electrical conductivity ranges from 0.5 to 2.0 mmhos/cm

LaCerda Series

Depth class: Deep
Drainage class: Moderately well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from shale
Slope range: 0 to 15 percent
Taxonomic class: Very-fine, smectitic, thermic Chromic Dystruderts

Typical Pedon

LaCerda clay loam, in an area of LaCerda clay loam, 1 to 3 percent slopes, in an area of woodland; from Ratcliff, 3.8 miles north-northeast on county road to Mt. Vernon Church, 0.8 mile east of Mt. Vernon Church on U.S. Forest Service Road 534, 50 feet south of road:

A—0 to 4 inches; dark brown (10YR 4/3) clay loam; few fine distinct brown (7.5YR 5/4) relict mottles; weak medium granular structure; hard, friable; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bw—4 to 15 inches; red (2.5YR 4/8) silty clay; many medium distinct light brownish gray (10YR 6/2) relict mottles; weak medium angular blocky structure; hard, firm; common fine and medium roots; few slickensides; few faint pressure faces; very strongly acid; gradual wavy boundary.

Bss1—15 to 34 inches; variegated grayish brown (10YR 5/2) and yellowish red (5YR 5/8) clay; weak medium angular blocky structure; extremely hard, extremely firm; common medium roots; common slickensides; very strongly acid; gradual wavy boundary.

Bss2—34 to 49 inches; gray (10YR 5/1) clay; many medium prominent red (2.5YR 4/6) and few medium distinct yellowish brown (10YR 5/6) relict mottles; weak medium angular blocky structure; extremely hard, extremely firm; few medium roots; common slickensides; strongly acid; gradual wavy boundary.

C—49 to 80 inches; brownish yellow (10YR 6/8) layered shale with clay texture; common medium prominent grayish brown (2.5Y 5/2) streaks; massive; very hard, very firm; neutral.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 60 to 70 percent
Redoximorphic features: Relict mottles in shades of gray, brown, or olive
Other distinctive soil features: Gilgai is cyclic within 8 to 15 feet with micro-highs 4 to 10 inches above micro-lows; cracks 1/2 inch to 2 inches wide extend to at least 40 inches deep for 60 to 90 cumulative days during most years; common or many intersecting slickensides begin at 15 to 31 inches deep
Concentrated minerals: None
Reaction: A horizon—strongly acid or moderately acid; Bw horizon—very strongly acid to moderately acid; Bss horizon—strongly acid to neutral; C horizon—neutral to moderately alkaline

A horizon:
Color—grayish brown, very dark grayish brown, very dark gray, dark grayish brown, dark gray, or dark brown
Redoximorphic features—none
Texture—clay loam
Other features—none
Thickness—less than 1 inch on micro-knolls; as much as 8 inches on micro-depressions

Bw horizon:
Color—reddish brown, red, light reddish brown, light red, yellowish red, reddish yellow, brown, strong brown, light brown, dark yellowish brown, yellowish brown, light yellowish brown, or brownish yellow
Redoximorphic features—light brownish gray, grayish brown, or gray relict mottles
Texture—clay or silty clay
Other features—none
Thickness—combined thickness of the A and Bw horizons ranges from 15 to 31 inches

Bss horizon:
Color—reddish brown, yellowish red, light reddish brown, reddish yellow, brown, strong brown, light brown, dark yellowish brown, yellowish brown, light yellowish brown, brownish yellow, olive brown, light olive brown, olive yellow, olive, or pale olive
Redoximorphic features—gray, light grayish brown, grayish brown, olive gray, or light olive gray relict mottles
Texture—clay or silty clay
Other features—intersecting slickensides

C horizon:
Color—reddish brown, yellowish red, light reddish brown, reddish yellow, brown, strong brown, light brown, dark yellowish brown, yellowish brown, light yellowish brown, brownish yellow, olive brown, light olive brown, olive yellow, olive, or pale olive

Redoximorphic features—none
Texture—shale with texture of clay loam to clay
Other features—none

Laneville Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landscape: Coastal plain
Landform: Flood plains
Parent material: Loamy and clayey alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Fine-silty, siliceous, thermic Fluvaquentic Eutrochrepts

Typical Pedon

Laneville loam, in an area of Laneville loam, frequently flooded (fig. 21), in a pasture; from Ratcliff, 5.4 miles north on Farm Road 227 to Hickory Creek flood plain, 0.8 mile east of flood plain:

Ap—0 to 5 inches; dark brown (10YR 4/3) loam; few fine distinct strong brown (7.5YR 5/8) redoximorphic concentrations; weak fine granular structure; hard, friable; many fine and medium roots; common fine pores; moderately acid; clear smooth boundary.

A—5 to 12 inches; brown (10YR 5/3) loam; few fine faint dark yellowish brown (10YR 3/4) redoximorphic concentrations; weak fine subangular blocky structure; many fine and medium roots; common fine pores; strongly acid; clear smooth boundary.

Bw1—12 to 27 inches; variegated dark yellowish brown (10YR 4/6) and grayish brown (10YR 5/2) loam; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; few light gray (10YR 7/2) silt coatings on ped faces; strongly acid; gradual wavy boundary.

Bw2—27 to 34 inches; variegated yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) loam; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; few light gray (10YR 7/1) silt coatings on ped faces; very strongly acid; gradual wavy boundary.

2Bgb1—34 to 40 inches; grayish brown (10YR 5/2) clay loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct yellowish red (5YR 5/8) redoximorphic concentrations; moderate medium subangular blocky structure;

Figure 21.—Profile of Laneville loam.

very hard, firm; common fine roots; common fine pores; strongly acid; clear wavy boundary.

2Bgb2—40 to 49 inches; grayish brown (10YR 5/2) clay loam; common medium distinct yellowish brown (10YR 5/4) and few fine prominent red (2.5YR 4/8) redoximorphic concentrations; moderate medium subangular blocky structure; very hard, very firm; common fine roots; few fine pores; strongly acid; clear smooth boundary.

2Bgb3—49 to 65 inches; dark gray (10YR 4/1) clay; common medium prominent dark red (2.5YR 3/6) and few fine distinct yellowish brown (10YR 5/4) redoximorphic concentrations; weak coarse angular blocky structure; very hard, very firm; few fine roots; few fine pores; few pressure faces; few gypsum crystals; moderately acid; gradual wavy boundary.

2Bgb4—65 to 87 inches; dark gray (10YR 4/1) clay; common medium distinct brown (7.5YR 4/4) redoximorphic concentrations; weak coarse angular blocky structure; very hard, very firm; few fine roots; few fine pores; few pressure faces and intersecting slickensides; common gypsum crystals; neutral.

Range in Characteristics

Solum thickness: More than 80 inches

Clay content in the control section: 25 to 35 percent

Redoximorphic features: Depleted matrix with few to many redoximorphic concentrations in shades of red, yellow, or brown beginning at 30 to 50 inches deep

Other distinctive soil features: Clayey discontinuity at 30 to 50 inches deep

Concentrated minerals: Iron-manganese concretions and masses typically range from few to 5 percent

Reaction: A or Ap horizon—strongly acid to slightly acid; Bw horizon—very strongly acid or strongly acid; 2Bg horizon—very strongly acid to moderately acid; some pedons are slightly acid or neutral below a depth of 60 inches

A or Ap horizon:

Color—very dark grayish brown, dark brown, dark yellowish brown, dark grayish brown, brown, grayish brown, or yellowish brown

Redoximorphic features—iron accumulations in shades of brown, red, and yellow range from none to few

Texture—loam

Other features—none

Ab horizon (where present):

Color—very dark grayish brown, dark brown, dark yellowish brown, dark grayish brown, brown, grayish brown, or yellowish brown

Redoximorphic features—iron accumulations in shades of brown, red, and yellow range from none to few

Texture—loam

Other features—buried A horizon is at 30 to 60 inches deep in some pedons

Bw horizon:

Color—brown, dark brown, dark yellowish brown, grayish brown, pale brown, light yellowish brown, or brownish yellow

Redoximorphic features—iron depletions with chroma of 2 or less range from few to many; some pedons have reddish redoximorphic concentrations

Texture—loam, clay loam, or silty clay loam

Other features—none

2Bg horizon:

Color—dark gray, dark grayish brown, gray, grayish brown, light gray, or light brownish gray

Redoximorphic features—depleted matrix with few to many redoximorphic concentrations in shades of red, yellow, or brown

Texture—clay loam or clay

Other features—none

Latex Series

Depth class: Very deep

Drainage class: Moderately well drained

Permeability: Slow

Landscape: Coastal plain

Landform: Uplands and stream terraces

Parent material: Loamy over clayey alluvium or marine sediments

Slope range: 1 to 3 percent

Taxonomic class: Fine-loamy, siliceous, thermic Glossic Paleudalfs

Typical Pedon

Latex loam, in an area of Latex loam, 1 to 3 percent slopes, in an area of woodland; from the intersection of Texas Highway 7 and Farm Road 227 at Ratcliff, 1 mile north on Farm Road 227, 1.75 miles north-northeast on county road, 0.65 mile east on logging road, 200 feet north of road:

A—0 to 4 inches; very dark grayish brown (10YR 4/2) loam; weak fine subangular blocky structure; slightly hard, friable; many fine and medium roots; moderately acid; clear smooth boundary.

Bt1—4 to 15 inches; strong brown (7.5YR 5/6) loam;

strong medium subangular blocky structure; hard, firm; common fine and medium roots; few clay films; few thin sand coatings on ped faces; 5 percent iron-manganese masses and concretions; strongly acid; gradual wavy boundary.

Bt2—15 to 28 inches; brownish yellow (10YR 6/6) clay loam; common medium distinct light yellowish brown (10YR 6/4) and common fine distinct yellowish red (5YR 4/6) masses of iron accumulation; strong medium subangular blocky structure; hard, firm; common fine and medium roots; few clay films; few thin sand coatings on ped faces; 10 percent iron-manganese masses and concretions; strongly acid; gradual wavy boundary.

Bt3—28 to 35 inches; brownish yellow (10YR 6/6) clay loam; common medium distinct light yellowish brown (2.5Y 6/4) and prominent red (2.5YR 4/6) masses of iron accumulation; moderate medium subangular blocky structure; hard, firm; few fine and medium roots; few clay films; few fine sand coatings on ped faces; 10 percent iron-manganese masses and concretions; strongly acid; gradual wavy boundary.

2Bt/E1—35 to 43 inches; variegated dark red (2.5YR 3/6), yellowish brown (10YR 5/6), and light brownish gray (10YR 6/2) clay; moderate medium subangular blocky structure; very hard, firm; common fine and medium roots; common clay films; about 5 percent streaks and pockets of albic material (E); 10 percent iron-manganese masses and concretions; strongly acid; gradual wavy boundary.

2Bt/E2—43 to 56 inches; variegated reddish yellow (7.5YR 6/6), gray (10YR 6/1), and yellowish red (5YR 5/6) clay; moderate medium subangular blocky structure; very hard, firm; common fine and medium roots; common clay films; about 5 percent streaks and pockets of albic material (E); 10 percent iron-manganese masses and concretions; strongly acid; irregular wavy boundary.

2Bt/E3—56 to 71 inches; brown (7.5YR 4/4) clay; common medium distinct brownish yellow (10YR 6/6) masses of iron accumulation and common fine distinct light brownish gray (2.5Y 6/2) iron depletions; moderate medium subangular blocky structure; very hard, firm; many fine and medium roots; common clay films; about 7 percent streaks and pockets of albic material (E); 15 percent iron-manganese masses and concretions; strongly acid; diffuse wavy boundary.

2B´t—71 to 80 inches; yellowish brown (10YR 5/8) clay; common medium distinct light brownish gray (2.5Y 6/2) iron depletions; weak medium subangular blocky structure; very hard, firm; few fine roots; few pressure faces along peds; common clay films; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 35 percent
Redoximorphic features: Redoximorphic concentrations in shades of red, yellow, or brown; iron depletions in shades of gray at 36 to 60 inches deep
Other distinctive soil features: Clayey discontinuity at 36 to 60 inches deep
Concentrated minerals: Iron-manganese concretions in the subsoil
Reaction: A horizon—very strongly acid to moderately acid; Bt, 2Bt/E, and 2B´t horizons—very strongly acid or strongly acid

A horizon:
Color—brown, dark brown, dark grayish brown, brown, dark yellowish brown, yellowish brown, or grayish brown
Redoximorphic features—none
Texture—loam
Other features—none

Bt horizon:
Color—yellowish brown, yellowish red, reddish yellow, brownish yellow, brown, or strong brown
Redoximorphic features—iron accumulations in shades of red, brown, or yellow range from none to common
Texture—loam, sandy clay loam, or clay loam
Other features—streaks and pockets of albic material range from 0 to 4 percent, by volume; ironstone pebbles range from 0 to 15 percent, by volume; however, in some pedons, spots 6 to 10 inches in diameter contain up to 35 percent pebbles
Thickness—combined thickness of the A and Bt horizons ranges from 35 to 60 inches

2Bt/E horizon:
Color—yellowish brown, brownish yellow, strong brown, or reddish yellow (Bt); grayish brown, light brownish gray, or pale brown (E)
Redoximorphic features—few or common iron accumulations in shades of red, yellow, or brown and iron depletions in shades of gray; or the horizon is variegated in these colors
Texture—clay loam or clay

Other features—albic material (E) consists of streaks and pockets, which make up 5 to 10 percent of the horizon; ironstone pebbles range from 0 to 15 percent, by volume; brittle red, dark red, or yellowish red iron segregations make up to 25 percent of the volume

2B´t horizon and 2Btg horizon (where present):

Color—dark red, red, light red, yellowish red, reddish yellow, brownish yellow, or yellowish brown

Redoximorphic features—few to many iron accumulations in shades of brown or yellow and iron depletions in shades of gray; some pedons have a depleted, grayish matrix with reddish, brownish, or yellowish redoximorphic concentrations

Texture—clay loam or clay with 35 to 55 percent clay

Other features—none

Lilbert Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Sandy and loamy marine sediments
Slope range: 2 to 5 percent
Taxonomic class: Loamy, siliceous, thermic Arenic Plinthic Paleudults

Typical Pedon

Lilbert loamy fine sand, in an area of Lilbert loamy fine sand, 2 to 5 percent slopes, in an area of cropland; 4.2 miles west of Grapeland on Farm Road 227, 1.3 miles south on Hays Springs Cemetery Road, 300 feet north of road:

Ap—0 to 5 inches; brown (10YR 4/3) loamy fine sand; weak medium granular structure; soft, friable; many fine and medium roots; moderately acid; clear smooth boundary.

E—5 to 27 inches; very pale brown (10YR 7/4) loamy fine sand; weak fine granular structure; soft, very friable; common fine and medium roots; strongly acid; clear smooth boundary.

Bt—27 to 38 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; few clay films; few fine dark brown concretions; very strongly acid; gradual wavy boundary.

Btv1—38 to 43 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium prominent red (2.5YR 4/6) relict masses of iron accumulation and few medium distinct light gray (10YR 7/2) relict iron depletions; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; about 5 percent plinthite; few clay films; very strongly acid; gradual wavy boundary.

Btv2—43 to 54 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium prominent red (2.5YR 4/6 and 10R 4/8) relict masses of iron accumulation and light gray (10YR 7/2) relict iron depletions; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; about 8 percent plinthite; few clay films; very strongly acid; gradual wavy boundary.

BCt—54 to 80 inches; dark red (2.5YR 3/6) sandy clay loam; common fine distinct strong brown (7.5YR 5/8) relict masses of iron accumulation and prominent light gray (10YR 7/2) relict iron depletions; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; about 3 percent plinthite; few clay films; very strongly acid; gradual wavy boundary.

Range in Characteristics

Solum thickness: 60 to more than 80 inches
Clay content in the control section: 18 to 30 percent
Redoximorphic features: None to common redoximorphic concentrations in shades of red or brown and iron depletions in shades of gray; iron depletions with chroma of 2 or less are below a depth of 30 inches
Other distinctive soil features: None
Concentrated minerals: 5 to 15 percent plinthite segregations at 30 to 60 inches
Reaction: Very strongly acid to moderately acid throughout, unless limed

A or Ap horizon:

Color—very dark grayish brown, dark grayish brown, dark brown, grayish brown, or brown

Redoximorphic features—none

Texture—loamy fine sand

Other features—none

E horizon:

Color—brown, yellowish brown, light yellowish brown, pale brown, or very pale brown

Redoximorphic features—none

Texture—loamy fine sand

Other features—none

Thickness—combined thickness of the A and E horizons ranges from 20 to 40 inches

Bt horizon:

Color—strong brown, yellowish brown, brownish yellow, yellowish red, or reddish yellow

Redoximorphic features—none to common relict iron depletions in shades of gray and iron accumulations in shades of red or brown; relict iron depletions with chroma of 2 or less are below a depth of 30 inches
Texture—fine sandy loam or sandy clay loam
Other features—nodular plinthite ranges from 0 to 4 percent

Btv horizon and Btv/E horizon (where present):
Color—shades of brown, red, or gray; or the horizon is variegated in these colors
Redoximorphic features—none
Texture—sandy loam, sandy clay loam, or clay loam
Other features—nodular plinthite makes up 5 to 15 percent; streaks, pockets, or coatings of albic material (E) range from few to about 10 percent; up to 15 percent of the mass is brittle

B´t horizon (where present) and BCt horizon:
Color—shades of brown, red, or gray; or the horizon is variegated in these colors
Redoximorphic features—none
Texture—sandy loam, sandy clay loam, or clay loam
Other features—nodular plinthite makes up less than 5 percent; streaks, pockets, or coatings of albic material (E) range from few to about 5 percent; up to 15 percent of the mass is brittle

BC and C horizons (where present):
Color—strong brown, brownish yellow, light gray, or gray
Redoximorphic features—none
Texture—stratified loamy sediments; some pedons have stratified weakly consolidated sandstone with texture of sandy clay loam or fine sandy loam
Other features—none

Lovelady Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Uplands
Parent material: Loamy marine sediments
Slope range: 1 to 8 percent
Taxonomic class: Loamy, mixed, thermic Arenic Glossudalfs

Typical Pedon

Lovelady loamy sand, in an area of Lovelady loamy sand, 1 to 5 percent slopes, in a pasture; from Crockett Loop 304, 7.5 miles east on Texas Highway 7 to Berea Community, 1.4 miles north on county road, 1.1 miles east on intersecting county road, 1400 feet south of road:

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine subangular blocky structure; soft, very friable; many very fine and fine roots; few rounded siliceous pebbles; slightly acid; clear smooth boundary.

A—4 to 11 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine subangular blocky structure; soft, very friable; common very fine and fine roots; few rounded siliceous pebbles; moderately acid; abrupt wavy boundary.

E—11 to 26 inches; pale brown (10YR 6/3) loamy fine sand; weak medium subangular blocky structure; soft, very friable; common very fine and fine roots; about 3 percent yellowish brown (10YR 5/6) coatings along root channels; few rounded siliceous pebbles; moderately acid; clear smooth boundary.

Bt/E1—26 to 42 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine prominent yellowish red (5YR 5/6) masses of iron accumulation; weak coarse prismatic structure parting to moderate medium subangular blocky structure; hard, firm; common very fine and fine roots; common fine pores; thin patchy clay films on surface of peds; about 7 percent albic material (E) along surface of prisms and in streaks and pockets within the matrix; few rounded siliceous pebbles; moderately acid; clear irregular boundary.

Bt/E2—42 to 50 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium faint dark yellowish brown (10YR 4/6) masses of iron accumulation; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; few very fine and fine roots; common fine pores; thin patchy clay films on surface of peds; about 18 percent albic material (E) along surface of prisms and in streaks and pockets within the matrix; few rounded siliceous pebbles and few rounded petrified wood fragments; few brittle masses less than 3 inches in diameter; strongly acid; clear smooth boundary.

2Bt/E—50 to 62 inches; light brownish gray (10YR 6/2) sandy clay loam; many medium prominent dark red (2.5YR 3/6) and common medium distinct brownish yellow (10YR 6/6) masses of iron accumulation; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm; few very fine and fine roots; few fine pores; thin patchy clay films on surface of peds; about 5 percent albic material

(E) mainly on surface of prisms; very strongly acid; gradual wavy boundary.

2Bt1—62 to 70 inches; light brownish gray (10YR 6/2) sandy clay loam; common fine and medium prominent dark red (10R 3/6) and common medium distinct light brown (7.5YR 6/4) masses of iron accumulation; weak medium subangular blocky structure; extremely hard, very firm; few very fine roots; few very fine pores; few thin patchy clay films on surface of some peds; few mica flakes; extremely acid; clear wavy boundary.

2Bt2—70 to 76 inches; light gray (10YR 6/1) sandy clay loam; common medium and coarse prominent red (2.5YR 4/8, 5/6) and common medium prominent dark red (10R 3/6) masses of iron accumulation and common medium distinct light gray (2.5Y 7/2) relict iron depletions; weak coarse subangular blocky structure; extremely hard, very firm; few very fine roots; few very fine pores; few thin patchy clay films on surface of some peds; few mica flakes; extremely acid; gradual wavy boundary.

2CB—76 to 80 inches; light brownish gray (2.5Y 6/2) sandy clay loam; common medium faint pale yellow (2.5Y 7/3) and few medium prominent dark red (10R 3/6) lithochromic mottles; angular rock-like structure; very hard, firm; few very fine roots; extremely acid.

Range in Characteristics

Solum thickness: 60 to 80 inches
Clay content in the control section: 18 to 35 percent
Redoximorphic features: None
Other distinctive soil features: Lithologic discontinuity marked by a discontinuous stone line at 40 to 60 inches deep
Concentrated minerals: None
Reaction: A or Ap, E, Bt/E, and 2Bt/E horizons—very strongly acid to slightly acid; 2Bt, 2CB, and 2C (where present) horizons—extremely acid to strongly acid

A or Ap horizon:
Color—very dark grayish brown, dark grayish brown, grayish brown, dark brown, or brown
Redoximorphic features—none
Texture—loamy sand
Other features—rounded siliceous pebbles and rounded fragments of petrified wood, typically less than 3 inches across the long axis, range from few to about 5 percent; clay content ranges from 2 to 6 percent; silt content ranges from 7 to 21 percent
Thickness—combined thickness of the A and E horizons ranges from 20 to 40 inches

E horizon:
Color—brown, yellowish brown, pale brown, light yellowish brown, brownish yellow, very pale brown, or yellow
Redoximorphic features—none
Texture—loamy sand or loamy fine sand
Other features—rounded siliceous pebbles and rounded fragments of petrified wood, typically less than 3 inches across the long axis, range from few to about 5 percent

Bt/E and 2Bt/E horizons:
Color—yellowish brown, light yellowish brown, brownish yellow, strong brown, light brown, reddish yellow, yellowish red, reddish brown, or light reddish brown
Redoximorphic features—none
Texture—sandy clay loam or fine sandy loam; rounded siliceous pebbles and fragments of petrified wood less than 3 inches across the long axis range from few to about 5 percent
Other features—albic material (E) in the form of streaks and pockets make up 5 to 30 percent of the horizon; however, some layers at least 4 inches thick have at least 15 percent

2Bt horizon:
Color—gray, grayish brown, light gray, light brownish gray, brown, or pinkish gray
Redoximorphic features—none
Texture—sandy clay loam, clay loam, or clay
Other features—rounded siliceous pebbles and fragments of petrified wood less than 3 inches across the long axis form a discontinuous stone line at the contact of the horizon

2CB horizon and 2C horizon (where present):
Color—shades of gray or brown
Redoximorphic features—none
Texture—sandstone with or without stratified layers of mudstone and shale with texture of fine sandy loam, sandy clay loam, or clay loam
Other features—none

Mollville Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Loamy alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Glossaqualfs

Typical Pedon

Mollville loam, in an area of Mollville-Besner complex, 0 to 2 percent slopes, in an area of woodland; from Loop 304 and Texas Highway 21 in Crockett, 23 miles east on Texas Highway 21, 4 miles south on U.S. Forest Service Road 511, 1 mile west of U.S. Forest Service Road 526, 100 feet north of road:

A—0 to 7 inches; grayish brown (10YR 5/2) loam; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; weak medium granular structure; slightly hard, friable; many fine, medium, and coarse roots; very strongly acid; clear wavy boundary.

Eg—7 to 14 inches; light brownish gray (10YR 6/2) loam; common fine faint yellowish brown (10YR 5/8) redoximorphic concentrations; weak medium platy structure; slightly hard, friable; common medium and coarse roots; very strongly acid; clear wavy boundary.

Btg/E1—14 to 30 inches; grayish brown (10YR 5/2) clay loam; many medium faint brown (10YR 5/3) redoximorphic concentrations; weak coarse prismatic structure parting to weak coarse angular blocky; very hard, firm; common medium and coarse roots; few clay films on ped faces; about 20 percent streaks and pockets of albic material (E); very strongly acid; gradual wavy boundary.

Btg/E2—30 to 44 inches; grayish brown (10YR 5/2) clay loam; common medium faint dark grayish brown (10YR 4/2) redoximorphic concentrations; weak coarse prismatic structure parting to weak coarse angular blocky; very hard, firm; common medium roots; few clay films on ped faces; about 15 percent streaks and pockets of albic material (E); very strongly acid; gradual wavy boundary.

Btg/E3—44 to 52 inches; grayish brown (10YR 5/2) clay loam; common medium faint dark grayish brown (10YR 4/2) iron depletions and few fine faint yellowish brown (10YR 5/8) redoximorphic concentrations; weak coarse prismatic structure parting to weak coarse angular blocky; very hard, firm; common medium roots; few clay films on ped faces; about 10 percent streaks and pockets of albic material (E); about 5 percent iron-manganese concretions; very strongly acid; gradual wavy boundary.

Btg—52 to 80 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; moderate coarse prismatic structure parting to moderate coarse angular blocky; very hard, firm; few medium roots; few clay films; few white salts; dark gray thinly banded krotovina; strongly acid; gradual wavy boundary.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 20 to 35 percent
Redoximorphic features: Depleted matrix with few to many redoximorphic concentrations in shades of brown, yellow, or red throughout the subsoil
Other distinctive soil features: None
Concentrated minerals: Electrical conductivity ranges from 1 to 4 mmhos/cm; exchangeable sodium ranges from 2 to 12 percent throughout the subsoil
Reaction: A, E, and Btg/E horizons—very strongly acid to moderately acid; Btg horizon—strongly acid to slightly alkaline

A horizon:
Color—very dark grayish brown, dark gray, gray, grayish brown, or dark grayish brown
Redoximorphic features—none
Texture—loam
Other features—none

E horizon:
Color—grayish brown, light gray, or light brownish gray
Redoximorphic features—none
Texture—loam
Other features—none
Thickness—combined thickness of the A and E horizons is less than 20 inches

Btg/E horizon:
Color—gray, light gray, grayish brown, or light brownish gray; the exteriors of some peds are darker than these colors
Redoximorphic features—depleted matrix with few to many redoximorphic concentrations in shades of brown, yellow, or red
Texture—loam, sandy clay loam, or clay loam (Btg)
Other features—albic material (E) in the form of streaks or pockets make up 15 to about 35 percent of the horizon

Btg horizon:
Color—gray, light gray, grayish brown, or light brownish gray; the exteriors of some peds are darker than these colors
Redoximorphic features—depleted matrix with few to many redoximorphic concentrations in shades of brown, yellow, or red; some pedons are variegated in these colors in the lower part of the horizon

Texture—loam, sandy clay loam, or clay loam
Other features—none

Moswell Series

Depth class: Deep
Drainage class: Well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from shale
Slope range: 1 to 15 percent
Taxonomic class: Very-fine, smectitic, thermic Vertic Hapludalfs

Typical Pedon

Moswell loam, in an area of Moswell loam, 1 to 3 percent slopes, in an area of woodland; from Kennard, 4.8 miles west on Texas Highway 7, 0.7 mile south along U.S. Forest Service Road 514, 1.3 miles west and south along U.S. Forest Service Road 590, 75 feet southeast of road:

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam; weak fine subangular blocky structure; slightly hard, friable; common fine roots; moderately acid; clear smooth boundary.
E—3 to 6 inches; pale brown (10YR 6/3) loam; weak fine subangular blocky structure; slightly hard, friable; common fine and medium roots; strongly acid; clear wavy boundary.
Bt1—6 to 11 inches; yellowish red (5YR 4/6) clay; few fine distinct strong brown (7.5YR 5/6) relict masses of iron accumulation; moderate fine subangular blocky structure; very hard, very firm; common fine roots; common fine pores; few fine clay films; few water-worn gravel; very strongly acid; clear wavy boundary.
Bt2—11 to 17 inches; yellowish red (5YR 4/6) clay; common medium distinct pale brown (10YR 6/3) relict iron depletions; moderate medium subangular blocky structure; very hard, very firm; common fine roots; common clay films; few water-worn gravel; strongly acid; clear wavy boundary.
Btssy1—17 to 23 inches; variegated red (2.5YR 4/6) and light brownish gray (10YR 6/2) clay; weak medium subangular blocky structure; very hard, very firm; common fine roots; common slickensides; common clay films; common gypsum crystals; very strongly acid; clear smooth boundary.
Btssy2—23 to 46 inches; light brownish gray (10YR 6/2) clay; many medium prominent red (2.5YR 5/8) relict masses of iron accumulation; weak fine subangular blocky structure; very hard, very firm; few fine roots; common slickensides; common clay films; common gypsum crystals; very strongly acid; gradual wavy boundary.
C—46 to 80 inches; horizontally bedded layers of light brownish gray (2.5Y 6/2), strong brown (7.5YR 5/8), and yellowish brown (10YR 5/6) shale with texture of clay; very hard, very firm; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 60 to 70 percent
Redoximorphic features: None
Other distinctive soil features: During some months in most years, the soil has cracks that extend at least 20 inches deep
Concentrated minerals: Gypsum crystals or barite masses; exchangeable sodium ranges from 8 to 13 percent; electrical conductivity ranges from 2 to 8 mmhos/cm in the lower part of the subsoil and in the substratum
Reaction: A and E horizons—very strongly acid to moderately acid; Bt and C horizons—extremely acid to strongly acid; Btssy horizon—extremely acid or very strongly acid

A horizon:
Color—very dark grayish brown, dark brown, dark yellowish brown, dark grayish brown, grayish brown, brown, or yellowish brown
Redoximorphic features—none
Texture—loam
Other features—none

E horizon:
Color—brown, yellowish brown, pale brown, or light yellowish brown
Redoximorphic features—none
Texture—loam
Other features—none

Bt horizon:
Color—red or yellowish red; or the horizon is variegated in these colors and shades of brown, yellow, or gray
Redoximorphic features—none
Texture—clay
Other features—aluminum saturation ranges from about 30 to 50 percent

Btssy horizon:
Color—dark gray, dark grayish brown, dark brown, gray, grayish brown, brown, light gray, light brownish gray, pale brown, very pale brown, dark reddish gray, reddish brown, or

reddish gray; or variegated in shades of gray, red, yellow, and brown
Redoximorphic features—none
Texture—clay
Other features—slickensides are few or common; gypsum and barite crystals are common or many; exchangeable sodium ranges from 8 to 13 percent; electrical conductivity ranges from 2 to 8 mmhos/cm

C horizon:
Color—shades of olive, brown, and yellow
Redoximorphic features—none
Texture—shale with texture of clay loam to clay
Other features—some pedons have gypsum or barite crystals or masses; exchangeable sodium ranges from 8 to 13 percent; electrical conductivity ranges from 2 to 8 mmhos/cm

Moten Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landscape: Coastal plain
Landform: Stream terraces
Parent material: Loamy alluvium over stratified mudstone, sandstone, or shale mainly from the Yegua Formation
Slope range: 0 to 2 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Oxyaquic Glossudalfs

Typical Pedon

Moten fine sandy loam, in an area of Moten-Multey complex, 0 to 2 percent slopes, in an area of woodland; from Farm Road 230 at Weldon, 0.15 mile south along county road, 2.3 miles south-southeast along county road, 0.7 mile northeast along timber company road, 0.1 mile south along logging road, 50 feet west of road:

A—0 to 4 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; hard, friable; common fine and medium roots; strongly acid; clear smooth boundary.
E—4 to 23 inches; light brownish gray (10YR 6/2) fine sandy loam; common fine distinct yellowish brown (10YR 5/6) and brown (10YR 5/3) masses; massive; hard, friable; common fine roots; strongly acid; clear smooth boundary.
Btg/E1—23 to 38 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine subangular blocky structure; hard, friable; few fine roots; about 15 percent albic material (E); few thin patchy clay films; strongly acid; gradual wavy boundary.
Btg/E2—38 to 56 inches; grayish brown (10YR 5/2) loam; few fine prominent brownish yellow (10YR 6/8) redoximorphic concentrations; weak fine subangular blocky structure; hard, friable; few fine roots; about 15 percent albic material (E); few thin patchy clay films; neutral; gradual wavy boundary.
B/Ct—56 to 64 inches; dark grayish brown (10YR 4/2) loam; light olive brown (2.5Y 5/6) silty clay loam (C); weak fine subangular blocky structure; few fine roots; about 3 percent albic material; few thin patchy clay films; few chert pebbles; neutral; gradual wavy boundary.
2C—64 to 80 inches; light olive brown (2.5Y 5/6) silt loam; massive; hard, friable; few fine roots; slightly acid.

Range in Characteristics

Solum thickness: 60 to 80 inches
Clay content in the control section: 12 to 18 percent
Redoximorphic features: Yellowish red, brownish yellow, strong brown, light olive brown, or yellowish brown redoximorphic concentrations range from none to many in the subsoil
Other distinctive soil features: Silt content in the control section ranges from 30 to 55 percent
Concentrated minerals: None
Reaction: A and E horizons—very strongly acid to moderately acid; Btg/E horizon—very strongly acid to neutral; B/Ct and 2C horizons—slightly acid to slightly alkaline

A horizon:
Color—very dark grayish brown, dark brown, dark grayish brown, or brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

E horizon:
Color—grayish brown or light brownish gray
Redoximorphic features—none
Texture—fine sandy loam, very fine sandy loam, loam, or silt loam
Other features—none
Thickness—combined thickness of the A and E horizons ranges from 20 to 35 inches

Btg/E horizon:
Color—dark gray, dark grayish brown, grayish brown, gray, light gray, or light brownish gray (Bt)
Redoximorphic features—yellowish red, brownish yellow, strong brown, light olive brown, or

yellowish brown iron accumulations range from none to many
Texture—fine sandy loam, loam, or silt loam
Other features—streaks and pockets of albic material (E) make up 5 to 35 percent of the horizon; however, at least one layer has 15 percent or more

B/Ct horizon:
Color—dark gray, dark grayish brown, grayish brown, gray, light gray, or light brownish gray (B); shades of brown or olive (C)
Redoximorphic features—yellowish red, brownish yellow, strong brown, light olive brown, or yellowish brown iron accumulations range from none to many
Texture—fine sandy loam, loam, or silt loam (B); clay loam or silty clay loam (C)
Other features—streaks and pockets of albic material (E) make up to 5 percent of the horizon

2C horizon:
Color—light olive brown or grayish brown
Redoximorphic features—none
Texture—stratified mudstone or sandstone with texture ranging from fine sandy loam or silt loam to clay loam; shale with texture of clay is encountered in some pedons
Other features—none

Multey Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Mounded stream terraces
Parent material: Wind-reworked alluvium from river and stream deposits
Slope range: 0 to 2 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Typic Glossudalfs

Typical Pedon

Multey fine sandy loam, in an area of Moten-Multey complex, 0 to 2 percent slopes, in a pasture; from Texas Highway 19 in Lovelady, 4.8 miles west on Farm Road 1280, 0.8 mile south on farm lane, 300 feet west of lane:

Ap—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine granular structure; soft, very friable; common fine and medium roots; strongly acid; clear smooth boundary.

E1—5 to 14 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; slightly hard, friable; common fine roots; strongly acid; gradual wavy boundary.

E2—14 to 22 inches; pale brown (10YR 6/3) fine sandy loam; weak fine granular structure; slightly hard, friable; common fine roots; strongly acid; clear wavy boundary.

E/Bt1—22 to 29 inches; brown (10YR 5/3) fine sandy loam; yellowish brown (10YR 5/6) loam (Bt); weak fine subangular blocky structure; slightly hard, friable; few fine roots; few fine pores; few pressures faces; few fine faint pale brown (10YR 6/3) glossic features; strongly acid; gradual wavy boundary.

E/Bt2—29 to 39 inches; pale brown (10YR 6/3) fine sandy loam; brownish yellow (10YR 6/6) loam (Bt); weak fine subangular blocky structure; slightly hard, friable; few fine roots; few fine pores; few pressure faces; few fine faint light brownish gray (10YR 6/2) glossic features; strongly acid; gradual wavy boundary.

Bt/E1—39 to 48 inches; brownish yellow (10YR 6/6) loam; few fine faint light brownish gray (10YR 6/2) relict iron depletions; weak medium subangular blocky structure; hard, friable; few fine roots; few fine pores; few clay films on ped faces; about 20 percent streaks and pockets of albic material (E); strongly acid; gradual wavy boundary.

Bt/E2—48 to 52 inches; brownish yellow (10YR 6/8) loam; common fine distinct dark yellowish brown (10YR 4/6) relict masses of iron accumulation and few fine faint light brownish gray (10YR 6/2) relict iron depletions; weak fine subangular blocky structure; hard, friable; few fine roots; few fine pores; few clay films on ped faces; about 15 percent streaks and pockets of albic material (E); strongly acid; clear wavy boundary.

Bt/E3—52 to 57 inches; brownish yellow (10YR 6/6) loam; common medium distinct red (2.5YR 4/8) relict masses of iron accumulation; moderate medium subangular blocky structure; hard, friable; few fine roots; few fine pores; few clay films on ped faces; about 10 percent streaks and pockets of albic material (E); very strongly acid; clear wavy boundary.

BC—57 to 62 inches; grayish brown (10YR 5/2) very fine sandy loam; few medium prominent brownish yellow (10YR 6/8) relict masses of iron accumulation; weak fine subangular blocky structure; hard, friable; few fine roots; few fine pores; very strongly acid; clear wavy boundary.

C—62 to 80 inches; brownish yellow (10YR 6/8) and

grayish brown (10YR 5/2) stratified fine sandy loam; massive; hard, friable; very strongly acid.

Range in Characteristics

Solum thickness: More than 60 inches
Clay content in the control section: 10 to 18 percent
Redoximorphic features: Light red, yellowish red, or reddish yellow relict masses of iron accumulation and relict iron depletions in shades of gray are in the subsoil
Other distinctive soil features: Silt content in the control section is more than 20 percent
Concentrated minerals: None
Reaction: A or Ap horizon—strongly acid to slightly acid; E horizon—very strongly acid or strongly acid; E/Bt and Bt/E horizons—very strongly acid to moderately acid; BC and C horizons—very strongly acid to moderately alkaline

A or Ap horizon:
Color—very dark grayish brown, dark brown, dark grayish brown, grayish brown, or brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

E horizon:
Color—grayish brown, brown, light brownish gray, or pale brown
Redoximorphic features—yellowish brown or brownish yellow relict masses of iron accumulation are in the lower part in some pedons
Texture—fine sandy loam, very fine sandy loam, or loam
Other features—none
Thickness—combined thickness of the A and E horizons ranges from 20 to 36 inches

E/Bt horizon:
Color—gray, grayish brown, brown, light gray, light brownish gray, or pale brown (E); yellowish brown, brownish yellow, strong brown, or reddish yellow (Bt)
Redoximorphic features—red, light red, yellowish red, or reddish yellow relict masses of iron accumulation are on interiors of peds; relict iron depletions in shades of gray are few or common
Texture—fine sandy loam, very fine sandy loam, or loam (Bt); very fine sandy loam or fine sandy loam (E)
Other features—none

Bt/E horizon:
Color—yellowish brown, brownish yellow, strong brown, reddish yellow, very dark gray, very dark grayish brown, dark gray, or dark grayish brown (Bt); gray, grayish brown, brown, light gray, light brownish gray, or pale brown (E)
Redoximorphic features—red, light red, yellowish red, or reddish yellow relict masses of iron accumulation are on interiors of peds; relict iron depletions in shades of gray are few or common
Texture—fine sandy loam, very fine sandy loam, or sandy clay loam (Bt); very fine sandy loam or fine sandy loam (E)
Other features—none

BC and C horizons:
Color—dark grayish brown, dark brown, grayish brown, brown, light brownish gray, or pale brown
Redoximorphic features—none
Texture—stratified very fine sandy loam, fine sandy loam, loam, or sandy clay loam
Other features—electrical conductivity typically exceeds 1 mmho/cm; in some places, ranges from 1 to 4 mmhos/cm

Naclina Series

Depth class: Deep
Drainage class: Well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from shale
Slope range: 15 to 35 percent
Taxonomic class: Fine, smectitic, thermic Chromic Hapluderts

Typical Pedon

Naclina clay loam, in an area of Naclina clay loam, 15 to 35 percent slopes, eroded, in a pasture; from the intersection of Farm Road 132 and Farm Road 2967 in Porter Springs, 7.1 miles west to Lazy P Ranch, 0.5 mile north to headquarters, 3.5 miles north-northwest along main ranch road to fork at the barns, 400 feet west of fork on a slope:

Ap—0 to 3 inches; very dark grayish brown (10YR 3/2) clay loam; weak fine subangular blocky structure; hard, firm; common fine and few medium roots; few water-worn pebbles; slightly acid; gradual wavy boundary.
Bw—3 to 9 inches; red (2.5YR 4/6) clay; common fine distinct dark brown (7.5YR 4/4) relict masses of iron accumulation; moderate medium angular blocky structure; very hard, very firm; common

fine and medium roots; few pressure faces; strongly acid; gradual wavy boundary.

Bss1—9 to 16 inches; strong brown (7.5YR 5/8) clay; common fine faint brown (7.5YR 5/4) relict masses of iron accumulation; moderate medium angular blocky structure; very hard, very firm; few fine roots; common slickensides; strongly acid; gradual wavy boundary.

Bss2—16 to 29 inches; light olive brown (2.5Y 5/6) clay; few fine prominent yellowish red (5YR 4/6) relict masses of iron accumulation; moderate medium angular blocky structure; very hard, very firm; common slickensides; slightly acid; gradual wavy boundary.

Bkss—29 to 41 inches; variegated grayish brown (2.5Y 5/2), yellowish brown (10YR 5/4), and brownish yellow (10YR 6/8) clay; weak fine angular blocky structure; very hard, very firm; common slickensides; few pitted calcium carbonate concretions; slightly alkaline; very slightly effervescent; abrupt smooth boundary.

C—41 to 80 inches; dark brown (10YR 4/4, 4/2) shale with texture of clay; coatings of yellowish brown (10YR 5/8) material on platy structure faces; slightly alkaline.

Range in Characteristics

Solum thickness: 40 to 60 inches

Clay content in the control section: 40 to 60 percent

Redoximorphic features: Relict iron depletions in shades of gray, brown, or olive are in the subsoil

Other distinctive soil features: Gilgai is cyclic within 8 to 15 feet; cracks 1 inch to 3 inches wide extend from the surface to a depth of more than 40 inches and are open for 60 to 90 cumulative days during most years; slickensides are at 10 to 24 inches deep

Concentrated minerals: Calcareous material is at 10 to 40 inches deep

Reaction: A or Ap, Bw, and Bss horizons—strongly acid to neutral; Bkss horizon—neutral to moderately alkaline; C horizon—slightly alkaline or moderately alkaline

A or Ap horizon:

Color—very dark grayish brown, dark grayish brown, dark brown, brown, dark reddish gray, reddish gray, or reddish brown

Redoximorphic features—none to few relict iron depletions in the lower part

Texture—clay loam

Other features—none

Thickness—less than 12 inches

Bw horizon:

Color—reddish brown, red, yellowish red, or strong brown

Redoximorphic features—gray, light brownish gray, or grayish brown relict iron depletions

Texture—clay

Other features—none

Thickness—combined thickness of the A and Bw horizons ranges from 10 to 24 inches

Bss horizon:

Color—reddish brown, red, yellowish red, or strong brown

Redoximorphic features—gray, light brownish gray, or grayish brown relict iron depletions

Texture—clay

Other features—few or common slickensides

Bkss horizon:

Color—light olive brown, olive brown, olive, or olive yellow

Redoximorphic features—brown, pale brown, light brownish gray, grayish brown, olive, gray, olive gray, light olive gray, or pale olive relict iron depletions

Texture—clay

Other features—few or common slickensides

C horizon:

Color—shades of gray or brown

Redoximorphic features—none

Texture—shale with texture of clay

Other features—none

Naconiche Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderately rapid

Landscape: Coastal plain

Landform: Flood plains

Parent material: Sandy and loamy alluvium from river and stream deposits

Slope range: 0 to 2 percent

Taxonomic class: Sandy, siliceous, thermic Cumulic Humaquepts

Typical Pedon

Naconiche mucky sandy loam, in an area of Naconiche mucky sandy loam, 0 to 2 percent slopes, in an area of woodland; from Loop 304 in Crockett, 7.8 miles northeast on Farm Road 2022, 3.4 miles east on county road, 2.1 miles northeast on U.S. Forest Service Road 544, 0.25 mile south on U.S. Forest Service boundary lane, 150 feet east on logging road to drainage area:

A1—0 to 8 inches; black (10YR 2/1) mucky sandy loam; massive; few fine gray (10YR 6/1) spots of sand; many fine, medium, and coarse roots; about 15 percent decomposing leaves and roots; very strongly acid; clear smooth boundary.

A2—8 to 14 inches; black (10YR 2/1) mucky sandy loam; single grained; common fine and medium roots; about 10 percent decomposing leaves and roots; strongly acid; gradual smooth boundary.

A3—14 to 25 inches; black (10YR 2/1) loamy fine sand; single grained; common medium dark gray (10YR 4/1) and gray (10YR 6/1) spots of sand; few fine roots; strongly acid; clear smooth boundary.

Cg1—25 to 38 inches; gray (10YR 5/1) fine sand; single grained; common medium very dark gray (10YR 3/1) and gray (10YR 6/1) spots of sand; few fine roots; strongly acid; gradual wavy boundary.

Cg2—38 to 49 inches; gray (10YR 5/1) fine sand; single grained; common medium white (10YR 8/1) spots of sand; few fine roots; strongly acid; gradual wavy boundary.

Cg3—49 to 55 inches; light gray (10YR 6/1) fine sand; single grained; common medium white (10YR 8/1) spots of sand; few fine roots; strongly acid; gradual wavy boundary.

Cg4—55 to 80 inches; light brownish gray (2.5Y 6/2) fine sand; few fine white (10YR 8/1) spots of sand; few fine roots; strongly acid.

Range in Characteristics

Solum thickness: More than 24 inches
Clay content in the control section: 2 to 12 percent
Redoximorphic features: Depleted matrix with few or common redoximorphic concentrations in shades of brown or yellow
Other distinctive soil features: Organic matter content ranges from 2 to 15 percent within 16 inches deep
Concentrated minerals: Iron-manganese concretions and masses range from none to few
Reaction: Extremely acid to strongly acid throughout

A horizon:
Color—black, very dark brown, dark brown, very dark gray, or very dark grayish brown
Redoximorphic features—none
Texture—mucky sandy loam in the upper part; loamy fine sand in the lower part
Other features—streaks and spots of black, white, gray, or brown range from none to common
Thickness—more than 24 inches

Cg horizon:
Color—gray, grayish brown, light gray, light brownish gray, or white
Redoximorphic features—depleted matrix with few or common redoximorphic concentrations in shades of brown or yellow
Texture—Sand or fine sand
Other features—none

Ab horizon (where present):
Color—black, very dark brown, dark brown, very dark gray, or very dark grayish brown
Redoximorphic features—none
Texture—sandy loam or loamy fine sand
Other features—black, white, gray, or brown streaks and spots range from none to common

Nahatche Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Flood plains
Parent material: Stratified loamy alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Fine-loamy, siliceous, nonacid, thermic Aeric Fluvaquents

Typical Pedon

Nahatche loam, in an area of Nahatche loam, frequently flooded, in a pasture; 1.6 miles northeast of Mapleton on Texas Highway 21, 0.45 mile south along farm lane on Lundy Ranch, 400 feet west of lane:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) loam; common fine prominent dark brown (7.5YR 3/4) and few fine prominent gray (7.5YR 5/0) stains; weak fine subangular blocky structure; slightly hard, friable; common fine roots; moderately acid; clear smooth boundary.

A—5 to 9 inches; variegated dark grayish brown (10YR 4/2), brown (10YR 5/3), dark brown (7.5YR 3/3), and yellowish brown (10YR 5/8) fine sandy loam; weak fine subangular blocky structure; slightly hard, friable; common fine roots; moderately acid; clear smooth boundary.

Bg1—9 to 24 inches; dark grayish brown (10YR 4/2) clay loam; common fine distinct dark yellowish brown (10YR 4/6) redoximorphic concentrations; moderate fine subangular blocky structure; hard, firm; common fine roots; neutral; gradual wavy boundary.

Bg2—24 to 40 inches; dark grayish brown (10YR 4/2) clay loam; common fine prominent yellowish brown (10YR 5/8) redoximorphic concentrations and distinct brown (7.5YR 4/2) iron depletions; moderate fine subangular blocky structure; hard, firm; few fine roots; few iron-manganese concretions; slightly acid; gradual smooth boundary.

Bg3—40 to 54 inches; grayish brown (10YR 5/1) loam; common medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; moderate fine subangular blocky structure; slightly hard, friable; few fine roots; few iron-manganese concretions; few streaks of light gray (10YR 7/2) clean sand on ped faces; slightly acid; gradual smooth boundary.

Ab1—54 to 69 inches; dark gray (10YR 4/1) clay loam; common medium prominent dark yellowish brown (10YR 4/6) redoximorphic concentrations; weak medium subangular blocky structure; hard, firm; few fine roots; few iron-manganese concretions; few streaks of light gray (10YR 7/2) clean sand on ped faces; neutral; gradual wavy boundary.

Ab2—69 to 80 inches; dark gray (10YR 4/1) clay loam; common medium distinct dark yellowish brown (10YR 3/4) redoximorphic concentrations; weak medium subangular blocky structure; hard, firm; few fine roots; few lenses of clean sand along ped faces; few iron-manganese concretions; neutral.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 35 percent
Redoximorphic features: Depleted matrix with few to many redoximorphic concentrations in shades of brown and yellow throughout the subsoil
Other distinctive soil features: Organic carbon distribution is irregular throughout the solum or more than 0.2 percent at 50 inches deep
Concentrated minerals: None
Reaction: Moderately acid through slightly alkaline throughout; however, reaction is strongly acid in some subhorizons

A or Ap horizon:
Color—brown, dark brown, grayish brown, dark grayish brown, or very dark grayish brown
Redoximorphic features—iron accumulations in shades of brown; iron depletions in shades of gray
Texture—loam
Other features—none

Upper part of the Bg horizon:
Color—dark grayish brown, grayish brown, dark gray, very dark gray, gray, and light brownish gray
Redoximorphic features—depleted matrix with few to many redoximorphic concentrations in shades of brown and yellow
Texture—loam, silty clay loam, or clay loam; thin strata of sandier textures are common
Other features—none

Lower part of the Bg horizon:
Color—dark gray, gray, or light gray
Redoximorphic features—depleted matrix with few to many redoximorphic concentrations in shades of brown and yellow
Texture—stratified loam, silty clay loam, or clay loam; thin strata of sandier textures are common
Other features—none

Ab horizon:
Color—brown, dark brown, grayish brown, dark grayish brown, or very dark grayish brown
Redoximorphic features—iron accumulations in shades of brown; iron depletions in shades of gray
Texture—loam, sandy clay loam, clay loam, or silty clay loam
Other features—buried A horizon is below 30 inches deep in some pedons

Ozias Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Flood plains
Parent material: Acid, clayey alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Fine, smectitic, thermic Aeric Dystraquerts

Typical Pedon

Ozias silty clay loam, in an area of Ozias-Pophers complex, frequently flooded, in an area of woodland; from Farm Road 227 in Ratcliff, 5.9 miles east on Texas Highway 7, 4.9 miles northwest on U.S. Forest Service Road 511-1, 1.7 miles east on county road, 1.8 miles east-northeast on paper company road:

A—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct strong brown

(7.5YR 5/6) redoximorphic concentrations; moderate fine subangular blocky structure; very hard, firm; many fine and medium roots; common fine and medium pores; very strongly acid; clear wavy boundary.

Bg1—5 to 15 inches; grayish brown (10YR 5/2) silty clay; common medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; moderate fine subangular blocky structure; very hard, firm; common fine and few medium roots; common fine and medium pores; few pressure faces; common yellowish red (5YR 4/6) root stains; very strongly acid; gradual wavy boundary.

Bg2—15 to 28 inches; grayish brown (10YR 5/2) silty clay; common medium prominent yellowish brown (10YR 5/6) and few medium prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderate fine subangular blocky structure; very hard, very firm; common fine and few medium roots; common fine and medium pores; few slickensides; common yellowish red (5YR 4/6) root stains; very strongly acid; gradual wavy boundary.

Bssg1—28 to 40 inches; grayish brown (10YR 5/2) silty clay; common medium prominent strong brown (7.5YR 5/6) and few fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderate fine angular blocky structure; very hard, very firm; common fine and few medium roots; common fine pores; common slickensides; common yellowish red (5YR 4/6) root stains; very strongly acid; gradual wavy boundary.

Bssg2—40 to 47 inches; gray (10YR 5/1) silty clay; common medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; moderate fine angular blocky structure; very hard, very firm; few fine and medium roots; common fine pores; common slickensides; common yellowish red (5YR 4/6) root stains; very strongly acid; gradual wavy boundary.

Bssg3—47 to 63 inches; gray (10YR 5/1) silty clay; common medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; moderate fine angular blocky structure; very hard, very firm; few fine and medium roots; few fine pores; common slickensides; common yellowish red (5YR 4/6) root stains; very strongly acid; gradual wavy boundary.

Bssg4—63 to 75 inches; gray (10YR 5/1) silty clay; common medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations and few medium faint dark gray (10YR 4/1) iron depletions; moderate fine angular blocky structure; very hard, very firm; few fine and medium roots; few fine pores; common slickensides; common yellowish red (5YR 4/6) root stains; very strongly acid; clear wavy boundary.

Bssg5—75 to 80 inches; gray (10YR 5/1) silty clay; common medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; moderate fine angular blocky structure; very hard, very firm; few fine and medium roots; few fine pores; common slickensides; common yellowish red (5YR 4/6) root stains; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches

Clay content in the control section: 35 to 60 percent

Redoximorphic features: Depleted matrix with none to common redoximorphic concentrations in shades of red, yellow, and brown throughout the subsoil

Other distinctive soil features: Silt content in the control section is more than 40 percent; gilgai microrelief; cracks 1/4 inch to 2 inches wide extend to more than 40 inches and are open for 60 to 90 cumulative days during most years; intersecting slickensides begin at 20 to 35 inches deep

Concentrated minerals: Crystals of gypsum and other salts range from none to common in the Bss horizon

Reaction: A and Bg horizons—extremely acid or very strongly acid; Bssg horizon—extremely acid to slightly alkaline

A horizon:

Color—very dark grayish brown, dark grayish brown, dark brown, grayish brown, or brown

Redoximorphic features—none

Texture—silty clay loam

Other features—electrical conductivity ranges from 0 to 4 mmhos/cm

Thickness—less than 6 inches thick where color is dark brown, very dark grayish brown, or dark grayish brown

Bg horizon:

Color—dark grayish brown, grayish brown, brown, dark gray, gray, light gray, or light brownish gray

Redoximorphic features—depleted matrix with none to common redoximorphic concentrations in shades of red, yellow, and brown

Texture—silty clay loam, clay loam, silty clay, or clay

Other features—electrical conductivity ranges from 0 to 4 mmhos/cm

Bssg horizon:

Color—dark grayish brown, grayish brown, brown, dark gray, gray, light gray, or light brownish gray

Redoximorphic features—depleted matrix with none to common redoximorphic concentrations in shades of red, yellow, and brown
Texture—clay, silty clay loam or silty clay
Other features—electrical conductivity ranges from 4 to 16 mmhos/cm; crystals of gypsum and other salts range from none to common

Penning Series

Depth class: Deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Uplands
Parent material: Loamy marine sediments
Slope range: 0 to 4 percent
Taxonomic class: Fine-loamy, siliceous, thermic Aquic Glossudalfs

Typical Pedon

Penning very fine sandy loam, in an area of Penning very fine sandy loam, 0 to 4 percent slopes, in an area of woodland; from Texas Highway 7 in Kennard, 3.5 miles south on Farm Road 2781, 200 feet west to a point 50 feet north of a drainage channel:

A—0 to 4 inches; brown (10YR 4/3) very fine sandy loam; few fine faint dark brown (10YR 3/3) redoximorphic concentrations; weak fine granular structure; slightly hard, friable; common fine and medium roots; common fine pores; moderately acid; clear smooth boundary.

E1—4 to 9 inches; brown (10YR 5/3) very fine sandy loam; few fine faint brownish yellow (10YR 6/6) redoximorphic concentrations; weak fine granular structure; slightly hard, friable; common fine roots; common fine pores; strongly acid; gradual wavy boundary.

E2—9 to 19 inches; pale brown (10YR 6/3) very fine sandy loam; few fine faint brownish yellow (10YR 6/6) redoximorphic concentrations; weak fine granular structure; slightly hard, friable; common fine roots; common fine pores; strongly acid; gradual wavy boundary.

Bt/E1—19 to 24 inches; yellowish brown (10YR 5/8) fine sandy loam; common fine distinct grayish brown (10YR 5/2) iron depletions; weak coarse prismatic structure parting to weak fine subangular blocky; slightly hard, friable; common fine roots; common fine pores; few patchy clay films; about 15 percent albic material (E) on surface of prisms and in streaks and pockets within the matrix; strongly acid; gradual wavy boundary.

Bt/E2—24 to 38 inches; brownish yellow (10YR 6/6) loam; common medium distinct grayish brown (10YR 5/2) iron depletions; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, friable; common fine roots; few fine pores; few patchy clay films; about 20 percent albic material (E) along surface of prisms and in streaks and pockets within the matrix; very strongly acid; gradual wavy boundary.

Bt/E3—38 to 50 inches; brownish yellow (10YR 6/6) sandy clay loam; few fine prominent yellowish red (5YR 5/8) redoximorphic concentrations; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; few fine roots; few fine pores; few patchy clay films; about 15 percent albic material (E) along surface of prisms and in streaks and pockets within the matrix; very strongly acid; clear wavy boundary.

Bt/E4—50 to 56 inches; grayish brown (10YR 5/2) sandy clay loam; common fine distinct brownish yellow (10YR 6/6) redoximorphic concentrations; weak coarse prismatic structure parting to moderate fine subangular blocky; hard, firm; few fine roots; few fine pores; common thin clay films on surface of prisms; about 15 percent albic material (E) on surface of prisms and in streaks and pockets within the matrix; moderately acid; clear wavy boundary.

2C—56 to 70 inches; light brownish gray (2.5Y 6/2) shale with texture of clay; few fine faint grayish brown (10YR 5/2) iron depletions; angular rock-like structure; few fine roots; neutral.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 18 to 25 percent
Redoximorphic features: Redoximorphic concentrations in shades of brown, yellow, or red and iron depletions in shades of gray are in the subsurface and subsoil layers
Other distinctive soil features: Silt content in the control section ranges from 30 to 45 percent
Concentrated minerals: Electrical conductivity ranges from 0 to 4 mmhos/cm in the subsoil
Reaction: A and E horizons—very strongly acid to moderately acid; Bt/E horizon—very strongly acid to slightly acid; 2C horizon—very strongly acid to neutral

A horizon:
Color—very dark gray, very dark grayish brown, dark brown, dark gray, dark grayish brown, or brown
Redoximorphic features—iron accumulations in shades of brown or yellow

Texture—very fine sandy loam
Other features—none

E horizon:
Color—grayish brown, brown, yellowish brown, light brownish gray, pale brown, or light yellowish brown
Redoximorphic features—iron accumulations in shades of brown or yellow; iron depletions in shades of gray
Texture—very fine sandy loam or loam
Other features—none

Bt/E horizon:
Color—grayish brown, brown, yellowish brown, light brownish gray, pale brown, light yellowish brown, brownish yellow, strong brown, pinkish gray, light brown, or reddish yellow
Redoximorphic features—few or common iron accumulations in shades of brown, yellow, or red; iron depletions in shades of gray
Texture—very fine sandy loam, loam, or sandy clay loam
Other features—electrical conductivity ranges from 0 to 4 mmhos/cm and typically increases with depth; albic material (E) makes up 5 to 25 percent; however, some parts of the horizon 4 inches or more thick contain 15 percent or more albic material

2C horizon:
Color—grayish brown, brown, yellowish brown, light brownish gray, pale brown, light yellowish brown, brownish yellow, light gray, very pale brown, yellow, light olive brown, olive brown, pale yellow, olive gray, olive, light olive gray, pale olive, or olive yellow
Redoximorphic features—none
Texture—mainly clay, but some pedons are clay loam
Other features—shale, mudstone, or stratified layers with strata of siltstone and sandstone in some pedons; electrical conductivity ranges from 2 to 8 mmhos/cm

Percilla Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey marine sediments that are high in glauconite
Slope range: 0 to 1 percent
Taxonomic class: Fine, mixed, thermic Aeric Epiaqualfs

Typical Pedon

Percilla clay loam, in an area of Percilla clay loam, 0 to 1 percent slopes, in an area of woodland; from the intersection of Loop 304 and Farm Road 2022, 5.1 miles north on Farm Road 2022, about 400 feet east of Farm Road 2022 in a depressional area:

A—0 to 4 inches, grayish brown (10YR 5/2) clay loam; few fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations and distinct very dark grayish brown (10YR 3/2) stains; weak fine subangular blocky structure; hard, friable; common fine and medium roots; strongly acid; clear wavy boundary.

Btg1—4 to 18 inches; dominantly variegated light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) clay; moderate fine subangular blocky structure; very hard, firm; common fine roots; few patchy clay films; strongly acid; gradual wavy boundary.

Btg2—18 to 26 inches; dominantly variegated light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; very hard, firm; few fine roots; few patchy clay films; very strongly acid; gradual wavy boundary.

Btg3—26 to 39 inches; dominantly variegated light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; very hard, firm; few fine roots; few patchy clay films; few iron-manganese concretions; very strongly acid; gradual wavy boundary.

Btg4—39 to 51 inches; dominantly variegated light gray (10YR 6/1) and brownish yellow (10YR 6/6) clay; moderate medium subangular blocky structure; very hard, firm; few fine roots; few patchy clay films; few iron-manganese concretions; very strongly acid; gradual wavy boundary.

Btg5—51 to 75 inches; dominantly variegated light gray (10YR 6/1), yellowish brown (10YR 5/6), and yellow (10YR 7/8) clay; weak fine subangular blocky structure; very hard, firm; few fine roots; few patchy clay films; very strongly acid; gradual wavy boundary.

C—75 to 83 inches; variegated strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and light olive brown (2.5Y 5/6) stratified weathered glauconitic material with texture of loam; massive; very hard, firm; 5 percent ironstone fragments; 5 percent pseudomorphic fossils; neutral.

Range in Characteristics

Solum thickness: 60 to 80 inches
Clay content in the control section: 35 to 50 percent
Redoximorphic features: Depleted matrix variegated with red, dark red, yellowish brown, yellowish red, strong brown, or olive brown redoximorphic concentrations throughout the subsoil
Other distinctive soil features: None
Concentrated minerals: None
Reaction: A and Btg horizons—very strongly acid to slightly acid; C horizon—moderately acid to neutral

A horizon:
Color—brown, dark brown, very dark grayish brown, or dark grayish brown
Redoximorphic features—masses of iron accumulation in shades of brown
Texture—clay loam
Other features—none

Btg horizon:
Color—dark gray, grayish brown, dark grayish brown, or light brownish gray
Redoximorphic features—depleted matrix variegated with red, dark red, yellowish brown, yellowish red, strong brown, or olive brown redoximorphic concentrations
Texture—clay loam or clay
Other features—none

C horizon:
Color—yellowish brown, strong brown, or light olive brown
Redoximorphic features—none
Texture—weathered glauconitic material with texture of stratified fine sandy loam, loam, sandy clay loam, clay loam, or clay
Other features—none

Pophers Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Flood plains
Parent material: Loamy and silty alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Fine-silty, siliceous, acid, thermic Aeric Fluvaquents

Typical Pedon

Pophers silt loam, in an area of Pophers silt loam, frequently flooded, in an area of woodland; from Loop 304, 8.5 miles west on U.S. Highway 287 to Shady Grove Baptist Church, 0.8 mile south on county road to McLean property, 0.4 mile east and southeast on farm lane to farmstead, 1.25 miles south-southeast on lane to bridge in the edge of woods, 0.15 mile southeast of bridge along lane, 20 feet northeast of lane near tributary channel:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam; few fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; weak fine subangular blocky structure; slightly hard, friable; many roots of all sizes; strongly acid; clear wavy boundary.
A2—4 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; weak fine subangular blocky structure; hard, friable; common fine roots; strongly acid; clear wavy boundary.
AB—10 to 16 inches; grayish brown (10YR 3/2) silty clay loam; common fine faint dark grayish brown (10YR 4/2) iron depletions; moderate fine subangular blocky structure; hard, friable; common fine roots; very strongly acid; clear wavy boundary.
Bg1—16 to 23 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations and faint gray (10YR 5/1) iron depletions; moderate fine subangular blocky structure; very hard, firm; common fine roots; very strongly acid; clear wavy boundary.
Bg2—23 to 30 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; moderate medium subangular blocky structure; very hard, firm; common fine roots; very strongly acid; clear wavy boundary.
Bg3—30 to 49 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct pale brown (10YR 6/3) redoximorphic concentrations; moderate medium subangular blocky structure; very hard, firm; few fine and medium roots; very strongly acid; clear wavy boundary.
Bg4—49 to 61 inches; grayish brown (10YR 5/2) silty clay loam; few medium distinct light gray (10YR 7/1) iron depletions; moderate medium subangular blocky structure; very hard, firm; few fine roots; very strongly acid; clear wavy boundary.
Bg5—61 to 82 inches; dark grayish brown (10YR 4/2) silty clay loam; few medium faint dark yellowish brown (10YR 3/4) stains; moderate medium subangular blocky structure; very hard, firm; few fine roots; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 20 to 35 percent
Redoximorphic features: Redoximorphic concentrations in shades of red, yellow, or brown and iron depletions in shades of gray are throughout the solum
Other distinctive soil features: Some pedons have buried A or B horizons
Concentrated minerals: Crystals of gypsum and other salts range from none to common; electrical conductivity ranges from 4 to 16 mmhos/cm in the lower part of the subsoil
Reaction: A horizon—extremely acid to moderately acid; Bg horizon—extremely acid to strongly acid

A horizon:
Color—very dark grayish brown, dark brown, dark grayish brown, brown, or grayish brown
Redoximorphic features—common reddish brown and strong brown redoximorphic concentrations; light brownish gray and grayish brown iron depletions
Texture—silt loam or silty clay loam
Other features—electrical conductivity ranges from 0 to 4 mmhos/cm

Upper part of the Bg horizon:
Color—dark grayish brown, grayish brown, light brownish gray, and light gray
Redoximorphic features—few to many reddish brown, red, light reddish brown, light red, yellowish red, reddish yellow, dark brown, light brown, strong brown, dark yellowish brown, yellowish brown, light yellowish brown, brownish yellow, or brown redoximorphic concentrations
Texture—silty clay loam, silt loam, or loam
Other features—electrical conductivity ranges from about 0.5 to 8.0 mmhos/cm

Lower part of the Bg horizon:
Color—very dark gray, dark brown, very dark grayish brown, dark gray, dark grayish brown, brown, gray, grayish brown, light gray, light brownish gray, pale brown, dark olive gray, olive gray, olive, light olive gray, or pale olive
Redoximorphic features—iron accumulations in shades of red, yellow, and brown range from few to many
Texture—silty clay loam, clay loam or silty clay
Other features—crystals of gypsum and other salts range from none to common; electrical conductivity ranges from 4 to 16 mmhos/cm

Portersprings Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Low stream terraces
Parent material: Loamy alkaline alluvial sediments or recent drape over residuum from the Deweyville Formation
Slope range: 0 to 1 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Argiudolls

Typical Pedon

Portersprings fine sandy loam, in an area of Portersprings fine sandy loam, 0 to 1 percent slopes (fig. 22), in a pasture; southwest of Mapleton on Texas Highway 21, 1.4 miles to Farm Road 2498, 3.8 miles west to the entrance of Rattle Snake Ranch, 1.3 miles south-southwest on ranch road, 300 feet north of lane:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark brown (10YR 3/3) dry; weak medium granular structure; hard, friable; many fine roots; very strongly acid; gradual smooth boundary.

A—9 to 16 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark brown (10YR 3/3) dry; few fine distinct yellowish brown (10YR 5/4) masses of iron accumulation; weak coarse prismatic structure parting to moderate fine subangular blocky; hard, friable; common fine and medium roots; common medium dark yellowish brown (10YR 4/4) worm casts; few pressure faces; very strongly acid; clear smooth boundary.

Bt1—16 to 22 inches; dark grayish brown (10YR 4/2) sandy clay loam, brown (10YR 5/3) dry; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; moderate coarse prismatic structure parting to moderate fine subangular blocky; hard, friable; common fine roots; common fine pores; common very dark grayish brown (10YR 3/2) clay films on ped faces; few fine iron-manganese concretions; very strongly acid; clear smooth boundary.

Bt2—22 to 29 inches; dark yellowish brown (10YR 4/6) sandy clay loam; common fine distinct strong brown (7.5YR 5/8) and few fine prominent red (2.5YR 4/6) masses of iron accumulation; moderate coarse prismatic structure parting to weak medium subangular blocky; hard, friable; common fine roots; common fine pores; many

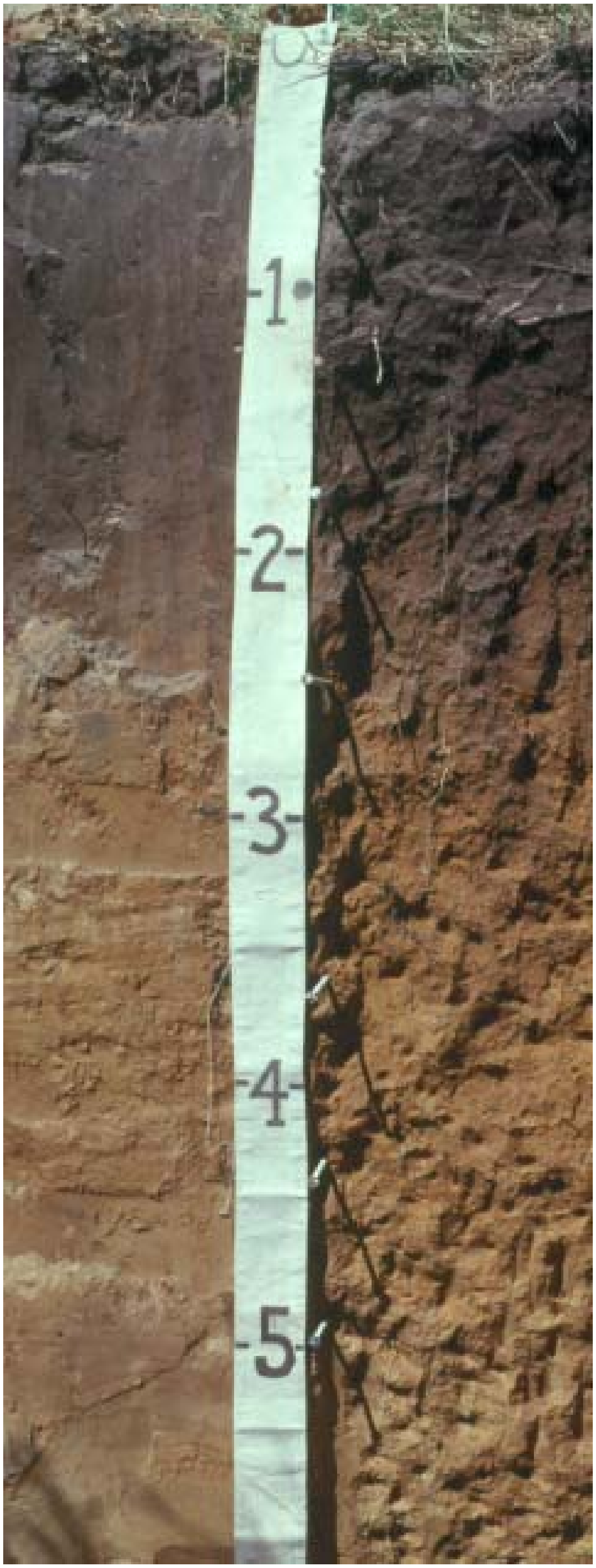


Figure 22.—Profile of Portersprings fine sandy loam.

continuous dark grayish brown (10YR 4/2) clay films on ped faces; few iron-manganese concretions; common very dark grayish brown (10YR 3/2) organic stains; very strongly acid; clear smooth boundary.

Bt3—29 to 42 inches; yellowish brown (10YR 5/8) fine sandy loam; common medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; common fine roots; common fine pores; common thin patchy dark yellowish brown (10YR 4/4) clay films on ped faces; common very dark grayish brown (10YR 3/2) organic stains; few iron-manganese concretions; very strongly acid; gradual smooth boundary.

BCt1—42 to 51 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; weak coarse subangular blocky structure parting to weak medium subangular blocky; hard, friable; common fine roots; common fine pores; common thin patchy clay films on ped faces; few iron-manganese concretions; few barite segregations; very strongly acid; gradual smooth boundary.

BCt2—51 to 58 inches; brownish yellow (10YR 6/8) loamy fine sand; common fine distinct strong brown (7.5YR 5/8) and few medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation; weak coarse subangular blocky structure; slightly hard, friable; common fine roots; common fine pores; few thin patchy clay films on ped faces; few iron-manganese concretions; moderately acid; gradual smooth boundary.

BCt3—58 to 72 inches; yellowish brown (10YR 5/6) loamy fine sand; common fine distinct strong brown (7.5YR 5/8) masses of iron accumulation; weak coarse subangular blocky structure; slightly hard, friable; common fine roots; common fine pores; few thin patchy clay films on ped faces; common fine patches of very pale brown (10YR 7/4) uncoated clean sand; slightly alkaline; gradual smooth boundary.

2C—72 to 87 inches; very pale brown (10YR 7/4) fine sand; common medium distinct yellowish brown (10YR 5/4) masses of iron accumulation; single grained; loose, very friable; common fine roots; slightly alkaline.

Range in Characteristics

Solum thickness: 60 to 80 inches
Clay content in the control section: 20 to 35 percent
Redoximorphic features: None

Other distinctive soil features: None
Concentrated minerals: Concretions or films and threads of calcium carbonate range from 0 to less than 5 percent in the lower part of the profile
Reaction: A or Ap horizon—very strongly acid to neutral; Bt, BCt, and 2C horizons—very strongly acid to slightly alkaline

A or Ap horizon:
Color—very dark brown, dark brown, or very dark grayish brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none
Thickness—10 to 23 inches

Upper part of the Bt horizon:
Color—dark grayish brown, dark brown, dark yellowish brown, brown, or yellowish brown
Redoximorphic features—none
Texture—loam, sandy clay loam, or clay loam
Other features—none

Lower part of the Bt horizon:
Color—yellowish brown, brown, strong brown, light brown, light yellowish brown, brownish yellow, reddish yellow, very pale brown, pink, or yellow
Redoximorphic features—none
Texture—loam, fine sandy loam, sandy clay loam, or clay loam
Other features—none

BCt horizon:
Color—Variegated in shades of brown and yellow
Redoximorphic features—none
Texture—loamy fine sand, fine sandy loam, loam, or sandy clay loam
Other features—none

2C horizon:
Color—grayish brown, brown, yellowish brown, strong brown, light brownish gray, pinkish gray, light yellowish brown, light brown, brownish yellow, reddish yellow, light gray, pale yellow, pink, or yellow
Redoximorphic features—none
Texture—fine sand
Other features—none

Rentzel Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Sandy and loamy marine sediments
Slope range: 0 to 4 percent
Taxonomic class: Loamy, siliceous, thermic Arenic Plinthaquic Paleudults

Typical Pedon

Rentzel loamy fine sand, in an area of Rentzel loamy fine sand, 0 to 4 percent slopes, in an area of woodland; 1.4 miles west of Grapeland on Farm Road 227 to Hays Spring Cemetery, 1.1 miles south and southwest, 300 feet northwest of road:

A—0 to 6 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; soft, very friable; common fine roots; moderately acid; clear wavy boundary.
E—6 to 26 inches; yellowish brown (10YR 5/4) loamy fine sand; weak fine granular structure; soft, very friable; common fine roots; strongly acid; gradual wavy boundary.
Bt1—26 to 40 inches; yellowish brown (10YR 6/8) sandy clay loam; common medium distinct grayish brown (10YR 5/2) iron depletions and prominent strong brown (7.5YR 5/8) redoximorphic concentrations; moderate medium subangular blocky structure; hard, firm; few fine roots; few patchy clay films on ped faces; very strongly acid; gradual wavy boundary.
Bt2—40 to 50 inches; brownish yellow (10YR 6/8) sandy clay loam; many medium distinct light brownish gray (10YR 6/2) iron depletions and common medium distinct strong brown (7.5YR 5/8) redoximorphic concentrations; moderate medium subangular blocky structure; hard, firm; few fine roots; about 2 percent, by volume, plinthite; common clay films on ped faces; very strongly acid; gradual wavy boundary.
Btv—50 to 59 inches; variegated light brownish gray (10YR 6/2), pale brown (10YR 6/3), strong brown (7.5YR 5/8), and yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; hard, firm; few fine roots; about 5 percent, by volume, plinthite; few fine iron-manganese concretions; common clay films on ped faces; very strongly acid; gradual wavy boundary.
BCt—59 to 80 inches; brownish yellow (10YR 6/8) fine sandy loam; few fine prominent gray (10YR 6/1) iron depletions and few medium distinct yellowish red (5YR 5/8) redoximorphic concentrations; weak medium subangular blocky structure; slightly hard, friable; about 2 percent, by volume, plinthite; common clay films on ped faces; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 15 to 35 percent
Redoximorphic features: Redoximorphic concentrations in shades of red, brown, or yellow; grayish brown and light brownish gray iron depletions are at 20 to 40 inches deep
Other distinctive soil features: Dry in some parts of the moisture control section in most years for 75 to 90 days
Concentrated minerals: More than 5 percent plinthite at 30 to 60 inches deep
Reaction: A and E horizons—strongly acid to slightly acid; Bt and BCt horizons—extremely acid to strongly acid

A horizon:
Color—grayish brown, dark grayish brown, very dark grayish brown, or dark brown
Redoximorphic features—none
Texture—loamy fine sand
Other features—none

E horizon:
Color—light gray, light brownish gray, grayish brown, pale brown, very pale brown, brown, yellowish brown, light yellowish brown, pinkish gray, or light brown
Redoximorphic features—none
Texture—loamy fine sand
Other features—none
Thickness—combined thickness of the A and E horizons ranges from 20 to 40 inches

Bt horizon:
Color—yellowish brown, strong brown, yellowish red, reddish yellow, or brownish yellow
Redoximorphic features—iron accumulations in shades of red, brown, or yellow; grayish brown and light brownish gray iron depletions; iron depletions increase with depth; in some pedons, the lower part may be variegated
Texture—fine sandy loam or sandy clay loam
Other features—none
Thickness—combined thickness of the A, E, and Bt horizons ranges from 30 to 60 inches

Btv horizon:
Color—variegated in shades of brown, red, and gray
Redoximorphic features—few or common iron accumulations in shades of brown or red and iron depletions in shades of gray
Texture—sandy clay loam
Other features—5 to 15 percent, by volume, nodular plinthite segregations; streaks, pockets, or coatings of albic material on peds range from few to 15 percent, by volume; brittle masses make up to 15 percent of the volume

BCt horizon:
Color—variegated in shades of brown, red, and gray
Redoximorphic features—few or common iron accumulations in shades of brown or red and iron depletions in shades of gray
Texture—fine sandy loam or sandy clay loam
Other features—none

Sacul Series

Depth class: Deep
Drainage class: Moderately well drained
Permeability: Slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey residuum from stratified sandstone and shale
Slope range: 1 to 3 percent
Taxonomic class: Clayey, mixed, thermic Aquic Hapludults

Typical Pedon

Sacul fine sandy loam, in an area of Sacul fine sandy loam, 1 to 3 percent slopes (fig. 23), in an area of woodland; from Crockett Loop 304, 7.75 miles northwest on Farm Road 229, 0.2 mile west on Wheeler Springs Road, 100 feet north of road:

A—0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; slightly hard, friable; common fine and medium roots; strongly acid; clear smooth boundary.
E—8 to 16 inches; light yellowish brown (10YR 6/4) fine sandy loam; few fine distinct brownish yellow (10YR 6/6) relict masses of iron accumulation; weak fine subangular blocky structure; soft, very friable, common fine and medium roots; strongly acid; clear smooth boundary.
Bt1—16 to 21 inches; red (2.5YR 4/6) clay; few fine prominent light brownish gray (10YR 6/2) relict iron depletions; moderate fine subangular blocky structure; very hard, very firm; few fine roots; continuous clay films on ped faces; very strongly acid; gradual wavy boundary.
Bt2—21 to 26 inches; dark red (2.5YR 3/6) clay; few fine prominent light brownish gray (10YR 6/2) iron depletions; moderate fine subangular blocky structure; very hard, very firm; few fine roots;

Figure 23.—Profile of Sacul fine sandy loam.

continuous clay films on ped faces; very strongly acid; gradual wavy boundary.

Btg—26 to 48 inches; light brownish gray (10YR 6/2) clay loam; common medium prominent dark red (2.5YR 3/6) masses of iron accumulation; moderate fine subangular blocky structure; very hard, very firm; few fine roots; continuous clay films on ped faces; very strongly acid; clear wavy boundary.

C—48 to 65 inches; stratified layers of red (2.5YR 4/8) sandstone with texture of fine sandy loam and light gray (10YR 7/2) shale with texture of clay loam; hard, firm; very strongly acid; gradual wavy boundary.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 35 to 60 percent
Redoximorphic features: Redoximorphic concentrations in shades of brown or yellow; iron depletions in shades of gray; or depleted matrix throughout the subsoil
Other distinctive soil features: None
Concentrated minerals: None
Reaction: A or Ap, and E horizons—very strongly acid to moderately acid; Bt and Btg horizons—extremely acid to slightly acid; C horizon—extremely acid to moderately acid

A or Ap horizon:
Color—very dark grayish brown, dark grayish brown, dark yellowish brown, brown, or dark brown; in cultivated areas, the Ap horizon is yellowish brown or brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

E horizon:
Color—brown, pale brown, yellowish brown, or light yellowish brown
Redoximorphic features—none
Texture—loamy fine sand, sandy loam, or fine sandy loam
Other features—none

Bt horizon:
Color—red, dark red, or yellowish red
Redoximorphic features—iron accumulations in shades of brown or yellow and iron depletions in shades of gray commonly increase with depth
Texture—clay or silty clay
Other features—none

Btg horizon:
Color—gray, grayish brown, or light brownish gray

Redoximorphic features—depleted matrix with redoximorphic concentrations in shades of red and brown
Texture—clay loam or clay
Other features—none

C horizon:
Color—red, gray, or brown
Redoximorphic features—none
Texture—stratified sandstone, shale, and loamy soil materials; the sandstone has texture of fine sandy loam or sandy clay loam; the loamy materials have texture of silt loam, silty clay loam, or clay loam; the shale has texture of clay loam
Other features—none

Sawlit Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Mounded stream terraces
Parent material: Loamy, wind-modified alluvium over clayey alluvial sediments from river and stream deposits
Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, siliceous, thermic Aquic Glossudalfs

Typical Pedon

Sawlit loam, in an area of Sawlit-Latex complex, 0 to 2 percent slopes; in a pasture; from Crockett Loop 304, about 13 miles east on Texas Highway 21, 3.4 miles east on Farm Road 1733 then south through gate onto C. M. Taylor Farm, 400 feet southeast in low area:

Ap—0 to 7 inches; dark brown (10YR 4/3) loam; few dark brown (7.5YR 4/4) masses of iron accumulation; weak medium subangular blocky structure; slightly hard, friable; common fine roots; few fine pores; strongly acid; gradual smooth boundary.

Bt—7 to 22 inches; brownish yellow (10YR 6/6) loam; few fine distinct yellowish red (5YR 4/6) masses of iron accumulation and common fine distinct light brownish gray (10YR 6/2) iron depletions; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; few fine pores; few patchy clay films; few pockets of albic material; few ironstone pebbles; strongly acid; gradual wavy boundary.

Bt/E—22 to 33 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium prominent red (2.5YR 4/8) redoximorphic concentrations and few fine distinct gray (10YR 6/1) iron depletions; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; few fine pores; few clay films on ped faces; about 15 percent streaks and pockets of albic material (E); few ironstone pebbles; very strongly acid; gradual wavy boundary.

2Bt1—33 to 49 inches; variegated dark red (2.5YR 3/6), strong brown (7.5YR 5/6), and gray (10YR 6/1) clay loam; moderate fine subangular blocky structure; hard, firm; few fine roots; few fine pores; few clay films on ped faces; few streaks and pockets of albic material on ped faces; very strongly acid; gradual wavy boundary.

2Bt2—49 to 62 inches; gray (10YR 6/1) clay loam; common medium prominent dark reddish brown (2.5YR 3/4) and many medium prominent brownish yellow (10YR 6/8) redoximorphic concentrations; weak medium subangular blocky structure; hard, firm; few fine roots; few clay films on ped faces; very strongly acid; gradual wavy boundary.

2Bt3—62 to 80 inches; variegated red (2.5YR 4/8), brownish yellow (10YR 6/8), and light gray (10YR 7/1) clay; weak fine subangular blocky structure; hard, firm; few fine roots; few clay films on ped faces; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 25 to 35 percent
Redoximorphic features: Few to many masses of iron accumulation in shades of red, yellow, or brown and iron depletions in shades of gray throughout the subsoil
Other distinctive soil features: Clayey discontinuity at 26 to 40 inches deep
Concentrated minerals: Crystals of gypsum and/or fine masses of barite in the lower part of the solum
Reaction: A or Ap, E (where present), Bt, and Bt/E horizons—very strongly acid to moderately acid; 2Bt horizon—extremely acid to strongly acid

A or Ap horizon:
Color—dark brown, very dark grayish brown, dark grayish brown, or brown
Redoximorphic features—none to few iron accumulations in shades of brown or red along root channels
Texture—loam
Other features—none

E horizon (where present):
Color—brown, pale brown, very pale brown, light brown, pink, light yellowish brown, or yellowish brown
Redoximorphic features—none to common iron accumulations or stains in shades of brown or red along root channels
Texture—fine sandy loam, very fine sandy loam, or loam
Other features—rounded ironstone and/or siliceous pebbles range from none to few
Thickness—combined thickness of the A and E horizons ranges from 7 to 20 inches

Bt horizon:
Color—strong brown, reddish yellow, or yellowish brown
Redoximorphic features—iron depletions in shades of gray and redoximorphic concentrations in shades of red, yellow, or brown are few or common, mainly in the lower part
Texture—loam, sandy clay loam, or clay loam
Other features—rounded ironstone and/or siliceous pebbles range from 0 to 4 percent

Bt/E horizon:
Color—strong brown, reddish yellow, yellowish brown, or brownish yellow
Redoximorphic features—iron depletions in shades of gray; redoximorphic concentrations in shades of red or brown
Texture—loam, sandy clay loam, or clay loam
Other features—streaks and pockets of albic material (E) range from 15 to 35 percent; rounded ironstone and/or siliceous pebbles range from 0 to 4 percent

2Bt horizon:
Color—gray, grayish brown, light gray, or light brownish gray
Redoximorphic features—few to many iron depletions in shades of gray and iron accumulations in shades of red, brown, or yellow; or horizon is variegated in these colors
Texture—clay loam or clay
Other features—streaks and pockets of albic material range from 0 to 4 percent; crystals of gypsum and/or fine masses of barite range from none to common

Tenaha Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Uplands
Parent material: Sandy and loamy residuum from stratified sandstone and shale
Slope range: 5 to 15 percent
Taxonomic class: Loamy, siliceous, thermic Arenic Hapludults

Typical Pedon

Tenaha loamy fine sand, in an area of Tenaha loamy fine sand, 5 to 15 percent slopes, in an area of woodland; from Farm Road 227 in Grapeland, 1.1 miles north on Farm Road 1272, 2 miles north on Farm Road 2968 and county road continuation, 1.4 miles northeast on farm lane to intersection of northern property line and pipeline, 0.1 mile south on pipeline, 25 feet west of pipeline:

A—0 to 4 inches; dark brown (10YR 4/3) loamy fine sand; weak medium granular structure; loose, very friable; many fine roots; strongly acid; clear smooth boundary.
E1—4 to 15 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; loose, very friable; many fine and medium roots; strongly acid; gradual smooth boundary.
E2—15 to 23 inches; pale brown (10YR 6/3) loamy fine sand; weak fine granular structure; loose, very friable; common fine roots; strongly acid; clear wavy boundary.
Bt1—23 to 34 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium prominent dark reddish brown (2.5YR 3/4) and distinct yellowish red (5YR 5/8) masses of iron accumulation; weak fine subangular blocky structure; hard, firm; few fine roots; few clay films on ped faces; strongly acid; gradual wavy boundary.
Bt2—34 to 45 inches; variegated dark reddish brown (2.5YR 3/4), light grayish brown (10YR 6/2), and yellowish brown (10YR 5/6) sandy clay loam; weak fine subangular blocky structure; hard, firm; few fine roots; few clay films on ped faces; streaks and pockets of albic material on ped faces; strongly acid; gradual wavy boundary.
BCt—45 to 58 inches; variegated dark red (2.5YR 3/6), light grayish brown (10YR 6/2), and yellowish brown (10YR 5/4) sandy clay loam; weak fine subangular blocky structure; hard, firm; few fine roots; few clay films on ped faces; few ironstone pebbles; very strongly acid; gradual wavy boundary.
C—58 to 80 inches; light gray (10YR 7/1) and dark red (10R 3/6) shale with texture of clay loam and brownish yellow (10YR 6/6), light gray (10YR

7/2), and strong brown (7.5YR 5/8) soft sandstone with texture of fine sandy loam; massive; very hard, firm; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 18 to 35 percent
Redoximorphic features: None
Other distinctive soil features: Siliceous and ironstone pebbles range from none to 15 percent, by volume, throughout the solum
Concentrated minerals: Few or common mica flakes in the lower part of the solum in most pedons
Reaction: A and E horizons—strongly acid to slightly acid; Bt, BCt, and C horizons—very strongly acid or strongly acid

A horizon:
Color—very dark grayish brown, dark yellowish brown, dark grayish brown, dark brown, grayish brown, or brown
Redoximorphic features—none
Texture—loamy fine sand
Other features—none

E horizon:
Color—pale brown, brown, or light yellowish brown
Redoximorphic features—none
Texture—loamy fine sand or fine sand
Other features—none
Thickness—combined thickness of the A and E horizons ranges from 20 to 40 inches

Bt horizon:
Color—dark yellowish brown, yellowish brown, strong brown, or yellowish red; or the horizon is variegated in these colors
Redoximorphic features—none
Texture—sandy clay loam, clay loam, or loam
Other features—grayish spots, pockets, or remnants of weathered shale range from none to about 5 percent, by volume, in the lower part

BCt horizon:
Color—shades of red, yellow, and brown
Redoximorphic features—none
Texture—sandy clay loam, fine sandy loam, or loam with or without strata of weakly cemented sandstone
Other features—discontinuous strata or pockets of grayish weathered shale range from none to 15 percent, by volume; most pedons contain few or common mica flakes

C horizon:
Color—loamy materials and sandstone are reddish, yellowish, or brownish; shale is mainly gray
Redoximorphic features—none
Texture—stratified weakly consolidated sandstone and shale with textures ranging from fine sandy loam to clay loam
Other features—none

Texark Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Flood plains
Parent material: Clayey alluvium from river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Very-fine, smectitic, thermic Aquic Hapluderts

Typical Pedon

Texark clay, in an area of Texark clay, frequently flooded, in a pasture; from Mapleton, 3.5 miles southwest on Texas Highway 21 to 7-J Ranch headquarters, 3.2 miles east on gravel and dirt road to a 90 degree right (south) turn, 0.35 mile south to levee and 150 feet south of levee:

Ap—0 to 13 inches; very dark gray (10YR 3/1) clay; moderate fine subangular blocky structure; extremely hard, very firm; many fine roots; slightly acid; gradual wavy boundary.
Bss1—13 to 26 inches; dark gray (10YR 4/1) clay; common fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations; weak medium subangular blocky structure; extremely hard, very firm; common fine roots; common slickensides; slightly acid; gradual wavy boundary.
Bss2—26 to 52 inches; dark gray (10YR 4/1) clay; few fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; weak medium subangular blocky structure; extremely hard, very firm; few fine roots; common slickensides; neutral; gradual wavy boundary.
Bss3—52 to 63 inches; dark gray (10YR 4/1) clay; few fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations and common fine faint gray (10YR 5/1) iron depletions; weak medium subangular blocky structure; extremely hard, very firm; few fine roots; common slickensides; neutral; gradual wavy boundary.
Bss4—63 to 80 inches; grayish brown (2.5Y 5/2) clay; common medium faint dark grayish brown (2.5Y

4/2) iron depletions; weak medium subangular blocky structure; extremely hard, very firm; few fine roots; common slickensides; few fine threads of gypsum; neutral.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 60 to 80 percent
Redoximorphic features: Redoximorphic concentrations in shades of brown; gray or grayish brown iron depletions in the lower part of the solum
Other distinctive soil features: Unless cultivated, there is gilgai microrelief; cracks 1/4 inch to 2 inches wide extend from the surface to 50 inches and remain open for 60 to 90 cumulative days during most years; slickensides begin at 10 to 28 inches deep
Concentrated minerals: Few threads of gypsum in the lower part of the solum in some pedons
Reaction: A or Ap horizon—slightly acid to slightly alkaline; upper part of the Bss horizon—very strongly acid to neutral; lower part of the Bss horizon—very strongly acid to moderately alkaline

A or Ap horizon:
Color—black or very dark gray
Redoximorphic features—none
Texture—clay
Other features—none
Thickness—as thin as 10 inches on micro-knolls; as thick as 28 inches on micro-depressions

Upper part of the Bss horizon:
Color—dark gray, dark grayish brown, or grayish brown
Redoximorphic features—few or common iron accumulations are faint to distinct in colors of yellowish brown, dark yellowish brown, brown, and strong brown
Texture—clay
Other features—few or common slickensides; cracks extending into this horizon are commonly filled with black or very dark gray soil from the surface

Lower part of the Bss horizon:
Color—grayish brown, gray, light gray, or light grayish brown
Redoximorphic features—iron accumulations in shades of brown; gray or grayish brown iron depletions
Texture—clay or silty clay
Other features—few or common slickensides

Tonkawa Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Rapid
Landscape: Coastal plain
Landform: Uplands
Parent material: Sandy marine sediments
Slope range: 0 to 8 percent
Taxonomic class: Thermic, coated Typic Quartzipsamments

Typical Pedon

Tonkawa fine sand, in an area of Tonkawa fine sand, 0 to 8 percent slopes, in an area of woodland; from Crockett Loop 304 and Farm Road 2022, 7.8 miles northeast on Farm Road 2022 to county road, 3.4 miles east on county road to intersection of U.S. Forest Service Road 544, 2.1 miles northeast on U.S. Forest Service Road 544 to farm entrance, 0.3 mile south along U.S. Forest Service boundary lane to Temple Inland property and follow lane around left curve, 0.2 mile northeast along lane, 30 feet west of lane:

A—0 to 6 inches; dark brown (10YR 4/3) fine sand; single grained; loose; common fine roots; strongly acid; clear wavy boundary.
C1—6 to 27 inches; light yellowish brown (10YR 6/4) fine sand; common medium faint very pale brown (10YR 7/3) pockets; single grained; loose; common fine roots; strongly acid; gradual wavy boundary.
C2—27 to 46 inches; very pale brown (10YR 7/4) fine sand; common medium faint white (10YR 8/2) pockets; single grained; loose; common fine roots; strongly acid; gradual wavy boundary.
C3—46 to 70 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few fine roots; strongly acid; gradual wavy boundary.
C4—70 to 82 inches; very pale brown (10YR 7/3) fine sand; few reddish yellow (5YR 6/6) thin bands in streaks less than 1/16 inch thick; single grained; loose; few fine roots; strongly acid.

Range in Characteristics

Solum thickness: 3 to 16 inches
Clay content in the control section: 2 to 8 percent
Redoximorphic features: None
Other distinctive soil features: Dry in some parts of the moisture control section for 125 to 150 cumulative days in most years
Concentrated minerals: None
Reaction: Extremely acid to moderately acid throughout

A horizon:
Color—dark brown, dark grayish brown, very dark grayish brown, or grayish brown
Redoximorphic features—none
Texture—fine sand
Other features—none

A2 horizon (where present):
Color—brown, yellowish brown, pale brown, light yellowish brown, or brownish yellow
Redoximorphic features—none
Texture—sand or fine sand
Other features—none

Bw horizon (where present):
Color—yellowish brown, brownish yellow, or reddish yellow
Redoximorphic features—none
Texture—sand or fine sand
Other features—none

C horizon:
Color—brown, light yellowish brown, pale brown, very pale brown, pink, or light brown
Redoximorphic features—none
Texture—sand or fine sand
Other features—none

Trawick Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Marine sediments high in glauconite
Slope range: 2 to 40 percent
Taxonomic class: Fine, mixed, thermic Mollic Hapludalfs

Typical Pedon

Trawick gravelly fine sandy loam, in an area of Trawick gravelly fine sandy loam, 2 to 5 percent slopes (fig. 24), in a pasture; from the intersection of U.S. Highway 287 and Farm Road 228 in Grapeland, 11.1 miles east on Farm Road 228, 1.3 miles south on county road, 300 feet west along intersecting county road, 150 feet south of road:

Ap—0 to 4 inches; dark reddish brown (2.5YR 3/4) gravelly fine sandy loam; moderate very fine subangular blocky structure; hard, friable; common fine and medium roots; few medium tubular pores; 20 percent common glauconitic ironstone pebbles; neutral; clear wavy boundary.

AB—4 to 10 inches; dark reddish brown (2.5YR 3/4)

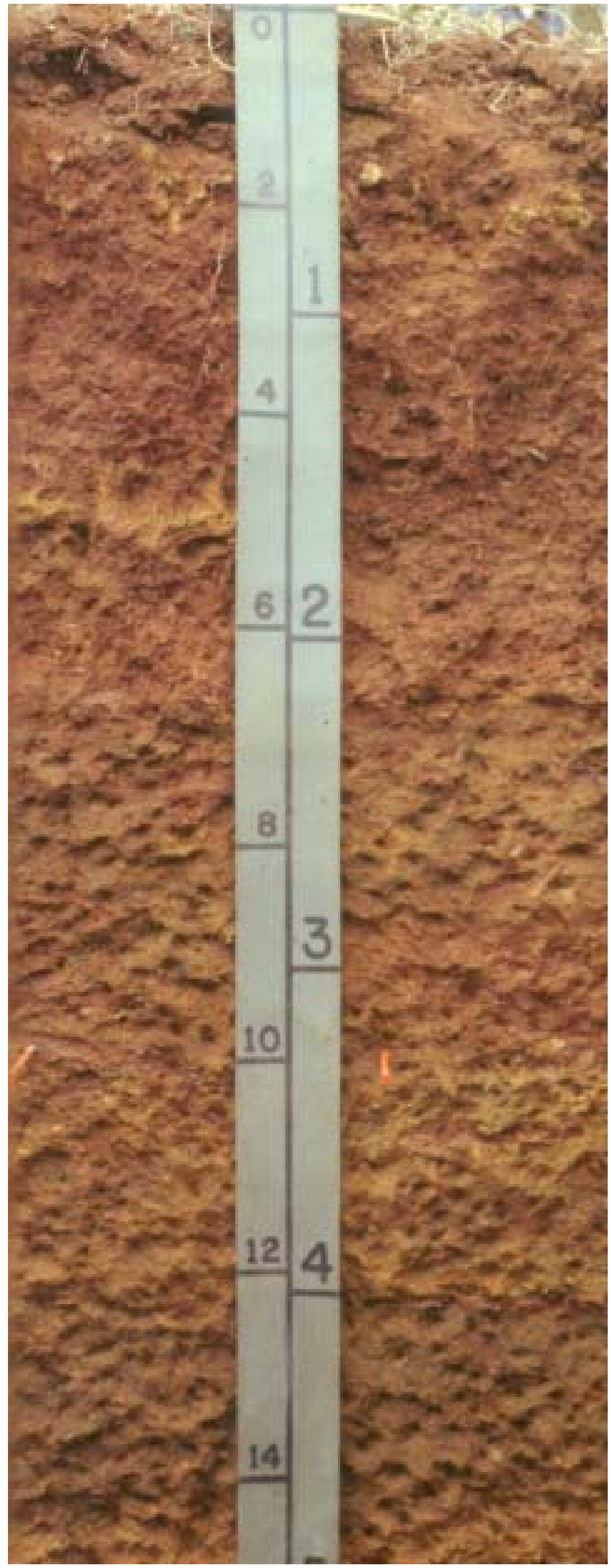


Figure 24.—Profile of Trawick gravelly fine sandy loam.

gravelly sandy clay loam; moderate medium subangular blocky structure; hard, firm; common fine and few medium roots between peds; few fine tubular pores; few medium weathered fragments of glauconitic material; few distinct dark reddish brown (2.5YR 3/4) discontinuous clay films on vertical and horizontal faces of peds; few medium cylindrical worms casts; 10 percent ironstone pebbles; neutral; clear wavy boundary.

Bt—10 to 23 inches; 90 percent dark red (2.5YR 3/6) and 10 percent brownish yellow (10YR 6/8) clay; moderate medium subangular blocky structure parting to moderate fine subangular blocky structure; very hard, firm; many fine and medium roots; few fine tubular pores; 10 percent weathered glauconitic material; few distinct dark red (2.5YR 3/6) continuous clay films on vertical and horizontal faces of peds; 5 percent ironstone nodules; neutral; clear wavy boundary.

BCt—23 to 38 inches; 50 percent dark red (2.5YR 3/6), 25 percent yellowish red (5YR 4/6), and 25 percent brownish yellow (10YR 6/8) clay; moderate medium subangular blocky structure parting to moderate fine angular blocky structure; very hard, firm; few fine roots between peds; few very fine tubular pores; 25 percent weathered glauconitic material; few distinct dark reddish brown (2.5YR 3/4) continuous clay films on vertical and horizontal faces of peds; very few black (7.5YR 2/0) discontinuous stains on horizontal faces of peds; few medium rounded ironstone nodules; slightly acid; abrupt wavy boundary.

Cr1—38 to 48 inches; variegated brown (7.5YR 4/4), dark red (2.5YR 3/6), and brownish yellow (10YR 6/8) weathered glauconitic material with texture of sandy clay; weakly cemented, very firm; few fine roots in cracks; few red clay flows along horizontal and vertical fractures; 20 percent, by volume, pseudomorphic fossils; few fine distinct black (7.5YR 2/0) discontinuous stains on horizontal faces of peds; slightly acid; clear wavy boundary.

Range in Characteristics

Solum thickness: 20 to 40 inches
Clay content in the control section: 35 to 55 percent
Redoximorphic features: None
Other distinctive soil features: None
Concentrated minerals: Ironstone gravel or fragments throughout the solum
Reaction: A or Ap and AB horizons—moderately acid to neutral; Bt and BCt horizons—strongly acid to neutral; Cr horizon—very strongly acid to slightly acid

A or Ap horizon:
Color—dusky red, dark reddish brown, or dark red
Redoximorphic features—none
Texture—fine sandy loam or gravelly fine sandy loam
Other features—ironstone gravel or fragments range from 2 to 35 percent, by volume

AB horizon (where present):
Color—dusky red, dark reddish brown, or dark red
Redoximorphic features—none
Texture—fine sandy loam, gravelly fine sandy loam, or gravelly sandy clay loam
Other features—ironstone gravel or fragments range from 2 to 35 percent, by volume

Bt and BCt horizons:
Color—dark reddish brown, dark red, dusky red, weak red, reddish brown, or red
Redoximorphic features—none
Texture—clay or clay loam
Other features—some pedons have partially weathered glauconitic materials in the lower part that are brown, yellow, or olive yellow when the fabric is crushed or cut with a spade; ironstone gravel or fragments range from 2 to 35 percent, by volume

Cr horizon:
Color—yellowish brown or brownish yellow with bands of dark brown, brown, dark reddish brown, dark reddish gray, reddish brown, dusky red, dark red, weak red, or red glauconitic shale or marl
Redoximorphic features—none
Texture—glauconite or greensand marl with bands of glauconitic shale or ironstone with texture of sandy clay loam, clay loam, or sandy clay
Other features—the horizon is weakly or strongly cemented when dry; psuedomorphic marine shells in the upper part; perfectly fossilized marine shells in the lower part

Woden Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landscape: Coastal plain
Landform: Stream terraces

Parent material: Loamy alluvium from river and stream deposits
Slope range: 1 to 3 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Typic Paleudalfs

Typical Pedon

Woden fine sandy loam, in an area of Woden fine sandy loam, 1 to 3 percent slopes, in a pasture; from Weches, 3.5 miles northeast on Texas Highway 21, 0.3 mile north at the intersection of U.S. Forest Service Road 511:

Ap—0 to 12 inches; brown (10YR 4/3) fine sandy loam; weak medium subangular blocky structure; slightly hard, very friable; many fine roots; strongly acid; clear smooth boundary.
Bt1—12 to 25 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; slightly hard, very friable; common fine roots; many fine pores; few clay films; few pressure faces; slightly acid; gradual smooth boundary.
Bt2—25 to 36 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; slightly hard, very friable; common fine roots; many fine pores; few clay films; few pressure faces; slightly acid; clear smooth boundary.
Bt3—36 to 52 inches; yellowish red (5YR 5/6) fine sandy loam; weak medium subangular blocky structure; slightly hard, friable; common fine roots; many fine pores; common clay films; clay bridges on sand grains; slightly acid; clear wavy boundary.
Bt4—52 to 62 inches; yellowish red (5YR 4/6) fine sandy loam; weak subangular blocky structure; slightly hard, friable; common fine roots; many fine pores; sand grains coated and bridged with clay; common clay films; slightly acid; gradual smooth boundary.
Bt5—62 to 74 inches; yellowish red (5YR 5/8) loam; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; common clay films; slightly acid; gradual smooth boundary.
Bt6—74 to 80 inches; strong brown (7.5YR 5/8) fine sandy loam; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; few fine pores; few clay films; slightly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 8 to 18 percent
Redoximorphic features: None
Other distinctive soil features: Weighted average silt content in the control section is 20 to 45 percent
Concentrated minerals: None
Reaction: A or Ap and E horizons—strongly acid to neutral; Bt horizon—strongly acid to slightly acid

A or Ap horizon:
Color—brown, reddish brown, dark reddish brown, dark grayish brown, or dark brown
Redoximorphic features—none
Texture—fine sandy loam
Other features—none

E horizon (where present):
Color—light brown, brown, reddish brown, light reddish brown, pale brown, or light yellowish brown
Redoximorphic features—none
Texture—loam, fine sandy loam, or loamy fine sand
Other features—none

Bt horizon:
Color—red, yellowish red, reddish brown, or strong brown; in some pedons, the lower part is variegated in shades of yellowish brown or light yellowish brown
Redoximorphic features—none
Texture—fine sandy loam or loam
Other features—none

Woodtell Series

Depth class: Deep
Drainage class: Well drained
Permeability: Very slow
Landscape: Coastal plain
Landform: Uplands
Parent material: Clayey marine sediments
Slope range: 1 to 15 percent
Taxonomic class: Fine, smectitic, thermic Vertic Hapludalfs

Typical Pedon

Woodtell very fine sandy loam, in an area of Woodtell very fine sandy loam, 1 to 3 percent slopes, in an area of woodland; from Loop 304 on the west side of Crockett, about 5.7 miles west on Texas Highway 7, about 1.8 miles north on Dixon-Hopewell Road, 0.9 mile west of road:

A—0 to 5 inches; very dark grayish brown (10YR 3/2) very fine sandy loam; weak fine granular structure; slightly hard, friable; common fine and medium roots; few pebbles; strongly acid; clear wavy boundary.
Bt1—5 to 18 inches; red (2.5YR 4/8) clay; common medium distinct pale brown (10YR 6/3)

lithochromic mottles; strong medium subangular blocky structure; very hard, very firm; few medium roots; common clay films on ped faces; very strongly acid; gradual wavy boundary.

Bt2—18 to 25 inches; red (2.5YR 4/6) clay; common medium distinct light brownish gray (10YR 6/2) lithochromic mottles; moderate medium subangular blocky structure; very hard, very firm; few fine roots; common clay films on ped faces; few slickensides; very strongly acid; gradual wavy boundary.

Btss1—25 to 33 inches; variegated light brownish gray (10YR 6/2) and red (2.5YR 4/8) clay; moderate medium subangular blocky structure; very hard, very firm; few fine roots; common clay films on ped faces; common slickensides; very strongly acid; gradual wavy boundary.

Btss2—33 to 56 inches; distinctly variegated light brownish gray (10YR 6/2) and dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; very hard, very firm; few fine roots; common clay films on ped faces; common slickensides; very strongly acid; gradual smooth boundary.

C—56 to 80 inches; light brownish gray (10YR 6/2) shale with texture of clay loam and few layers of yellowish red (5YR 5/6) and strong brown (7.5YR 5/8) soft sandstone with texture of fine sandy loam; moderately acid.

Range in Characteristics

Solum thickness: 40 to 80 inches

Clay content in the control section: 40 to 60 percent

Redoximorphic features: None

Other distinctive soil features: Clay content in the subsoil decreases by 20 to 30 percent within 60 inches if the solum is more than 60 inches deep; siliceous and ironstone pebbles range from 0 to 5 percent in the solum; during some months in most years, the soil has deep cracks to at least 20 inches deep

Concentrated minerals: None

Reaction: A and E (where present) horizons—very strongly acid to slightly acid; Bt horizon—very strongly acid or strongly acid; Btss horizon—very strongly acid to moderately acid; C horizon—very strongly acid to neutral

A horizon:

Color—very dark grayish brown, dark grayish brown, grayish brown, dark yellowish brown, brown, yellowish brown, or dark brown

Redoximorphic features—none

Texture—very fine sandy loam

Other features—none

Thickness—less than 7 inches thick where color is very dark grayish brown or dark brown

E horizon (where present):

Color—brown, pale brown, or very pale brown

Redoximorphic features—none

Texture—fine sandy loam, very fine sandy loam, or loam

Other features—none

Thickness—combined thickness of the A and E horizons is less than 10 inches

Bt horizon:

Color—weak red, red, reddish brown, or yellowish red

Redoximorphic features—none

Texture—clay, sandy clay, or clay loam

Other features—none

Btss horizon:

Color—shades of gray, red, or brown; or the horizon is variegated in these colors and shades of yellow

Redoximorphic features—none

Texture—clay, sandy clay, or clay loam

Other features—few or common slickensides

C horizon:

Color—variegated in shades of gray, brown, yellow, and olive with or without reddish colors

Redoximorphic features—none

Texture—thinly bedded or stratified with loamy, clayey, and shaley materials; the composite texture is typically clay loam or clay with clay content of 30 to 50 percent

Other features—none

Formation of the Soils

In this section the factors of soil formation are described and related to the formation of the soils in Houston County. Also, the processes of soil formation and the surface geology of the county are described.

Factors of Soil Formation

A soil is a three-dimensional natural body consisting of mineral and organic material that can support plant growth. The nature of any soil at a given site is the result of the interaction of five general factors—parent material, climate, plants and animals, relief, and time. Climate and plants and animals have an affect on parent material that is modified by relief over time. Theoretically, if all these factors were identical at different sites, the soils at these sites would be identical. Differences among the soils are caused by variations in one or more of these factors.

Parent Material

Parent material is the unconsolidated mass from which a soil forms. It affects the chemical and mineral composition of the soil. The parent material in Houston County consists of unconsolidated sandy, loamy, and clayey sediments deposited by waters of the Eocene, Pleistocene, and Holocene geologic ages of the Tertiary and Quaternary Systems.

Houston County is in the Coastal Plain physiographic region of Texas. All of the geological formations are sedimentary.

Deposits of Eocene age (about 40 to 50 million years) are the Queen City, Weches, Sparta, Cook Mountain, and Yegua Formations of the Claiborne Group. The fluviatile terraces in Houston County are probably of Pleistocene age. Holocene age sediments are alluvial deposits of the Neches and Trinity Rivers and many smaller streams.

The Queen City Formation outcrops in much of the northeastern corner and central part of Houston County. This formation is made up of fine-grained quartz sand interbedded with clay, silt, and lentils of glauconitic greensand. Soils that have formed in these sediments are common to the Cuthbert-Kirvin-Lilbert general soil map unit.

The Weches Formation is a thin band that is exposed on hills in areas known as “redlands.” This formation is made up of greensand, sand, and clay. Soils that have formed in these sediments are common to the Alto-Trawick general soil map unit.

The Sparta Sand is in the north-central part of the county. This formation is made up mostly of fine-grained sand with parting of silty clay and carbonaceous clay. This formation in east Texas occurs on high ridges above the greensand beds and caps most of the ferruginous hills along stream divides. Soils that have formed in these sediments are common to the Lilbert-Betis-Darco and Cuthbert-Kirvin-Lilbert general soil map units.

The Cook Mountain Formation forms a band through the central part of the county. This formation is made up mostly of clayey and shaly deposits that are generally gypsiferous and sometimes calcareous. Soils that have formed in these sediments are common to the Cuthbert-Kirvin-Lilbert and Woodtell-Etoile general soil map units.

The Yegua Formation forms the southern part of the county starting south of Crockett. This formation is made up mostly of loamy sediments underlain by weakly cemented sandstone or siltstone. Soils that have formed in these sediments are common to the Kurth-Fuller-Keltys and Fuller-Penning-Herty general soil map units.

The Jackson Group consists of the Caddell, Wellborn, and Manning Formations. These formations are made up mostly of clayey sediments underlain by mudstone and shale. Soils that have formed in these sediments are common to the Herty-Moswell-Fuller and Fuller-Penning-Herty general soil map units.

The fluviatile terrace deposits of Pleistocene age are in all parts of the county, but are dominantly along the stream systems above the present day flood plains. In places, the sedimentary deposits are several feet thick, and in other places, they are only a thin veneer over older geological sediments.

Loamy sediments deposited over older, more clayey materials give rise to the Freestone and Latex

soils. These moderately well drained soils have a subsoil that is loamy in the upper part and clayey in the lower part. These soils are found in the Freestone-Latex-Annona general soil map unit.

Clayey terrace soils along the Trinity River and tributaries formed in recent alkaline, clayey sediments washed from the Blackland Prairies. Soils that have formed in these sediments are common to the Eastham-Garner-Hallsbluff general soil map unit.

The youngest geologic unit in the county is the Holocene alluvium on flood plains of modern streams. The clayey flood plain deposits along the Trinity River are represented by the Texark-Kaufman general soil map unit.

The loamy and clayey sediments along the streams in the northern and central part of the county that drain the uplands and savannas are represented by the Laneville-Nahatche-Hannahatchee general soil map unit.

The loamy and silty sediments on the Neches River and along streams draining the woodlands of the southern part of the county are represented by the Pophers-Koury general soil map unit.

Climate

Houston County has a warm climate. Summers are hot and humid. In winter, an occasional surge of cold air causes a sharp drop in otherwise mild temperatures. The climate is fairly uniform, but the rainfall decreases slightly from east to west. Rainfall is evenly distributed throughout the year, reaching slight peaks in spring and fall. Precipitation is normally adequate for crops.

Climate is also modified locally by relief and runoff. The high temperatures and adequate rainfall favor plant growth as well as chemical and microbial activity. This has resulted in the formation of many deep soils in the county.

The microclimate in a given area also affects soil formation. Texark soils, which are in low-lying flood plains, receive runoff from adjacent slopes as well as floodwater from upstream. The extra water creates a wet microclimate that results in prolonged saturation, reduction of iron, and a gray subsoil. Sloping soils, such as Austonio soils, formed under a drier microclimate because of runoff. This better external drainage results in better aeration, oxidation of iron, and a yellowish red subsoil.

Plant and Animal Life

The vegetation under which a soil forms influences soil properties, such as color, structure, reaction, and content and distribution of organic matter. Vegetation extracts water from the soil, recycles nutrients, and adds organic matter to the soil. Gases derived from root respiration combine with water to form acids that influence the weathering of minerals. Because of a lower content of organic matter, soils that formed under forest vegetation are generally lighter colored than those that formed under grasses.

Bacteria, fungi, and many other micro-organisms decompose organic matter and release nutrients to growing plants. They influence the formation of soil structure. Soil properties such as drainage, temperature, and reaction influence the type of micro-organisms that live in the soil. Fungi are generally more active in the more acid soils, while bacteria are more active in the less acid and more alkaline soils.

Earthworms, insects, and small burrowing animals mix the soil and create small channels that aid in soil aeration and water movement. Earthworms help to incorporate crop residue or other organic matter into the soil. The organic matter improves tilth. In areas that are well populated with earthworms, the leaf litter that accumulates on the soil in the fall is generally incorporated into the soil by the following spring. If the earthworm population is low, part of the leaf fall can remain on the soil surface for several years.

Human activity can significantly influence soil formation. The clearing of native forests followed by continuous farming may drastically change activities within the soil. Cultivation generally accelerates erosion on sloping soils, affects soil structure and compacting, and lowers the content of organic matter. Drainage of wet soils changes soil formation. Fertilizers, lime, and pesticides also affect soil formation. Developing land for urban uses or for mining significantly influences soil development.

Relief

Relief, or topography, influences soil development through its effect on drainage, runoff, and depth of penetration of soil moisture.

The relief of the survey area consists of nearly level areas of bottomlands and terraces. Most of the broad interstream divides are gently sloping to sloping. Side slopes above drainageways are generally strongly sloping to moderately steep. A few hills are steep.

If other factors are equal, the degree of soil profile development depends on the amount, depth, and penetration of soil moisture. The more often a soil passes through a wetting and drying cycle, the greater and more distinct the soil development.

Soils on a nearly level landscape tend to have marked differences in soil development. Nearly level areas that are poorly drained and that remain saturated much of the time generally do not have pronounced soil horizonation. Nearly level soils that are well drained generally are distinctly developed to a depth of more than 80 inches.

Most of the gently sloping and moderately sloping soils are developed to a depth of more than 80 inches. As the slope increases above 8 percent, the depth of water penetration generally decreases. Since much of the water is removed by runoff, the solum of the more sloping soils tends to be more thinly developed.

Time

A great length of time is required for the formation of soils with distinct horizons. The differences in the length of time that the parent material has been in place are commonly reflected in the degree of development of soil horizons. Young soils have very little horizon development, and old soils have well expressed horizons.

Iulus and Nahatche soils are young soils. They are on flood plains where sediment is continuously added. These soils have little soil horizon development.

Advanced stages of development are evident in many of the soils in Houston County. The Kirvin soils, for example, were formed over a longer period of time and have been leached of most bases and have distinct horizonation.

Processes of Horizon Differentiation

Soil forms through complex processes that are grouped into four general categories. These are additions, removals, transfers, and transformations. These processes affect soil formation in differing degrees and account for the presence of soil layers or horizons.

The accumulation of organic matter in the A horizon of the soils in Houston County is an example of an addition. This accumulation is the main reason for the dark color of the A horizon. The color of the raw parent material is uniform with increasing depth.

The leaching of lime or bases from the upper few feet in many of the soils is an example of removal. The parent materials of these soils contain more lime or bases than the soil itself. This indicates leaching of the soil profile by percolating water.

The movement of clay and other materials from the A horizon to the B horizon is an example of transfer. The E horizon is a zone of maximum eluviation, or loss. The B horizon is a zone of illuviation, or gain. Annona, Moswell, Woodtell, and many other soils have maximum clay content in the B horizon. An indication of a transfer of clay is thin clay films in pores and on faces of peds.

An example of a transformation is the reduction of ferrous iron. This process takes place under wet, saturated conditions in which there is no molecular oxygen. Gleying, or the reduction of iron, is evident in Derly, Fuller, and Mollville soils which have a dominantly gray subsoil. The gray color indicates the presence of reduced iron, which in turn implies wetness. Reduced iron is soluble, but it commonly has been moved only short distances in the soils in the survey area, stopping in a lower part of the horizon where it originated or in an underlying horizon. Part of this iron can be reoxidized and segregated in the form of stains, concretions, or bright yellow and red accumulations.

Surface Geology

Prepared by Saul Aronow, professor emeritus, Lamar University, Beaumont, Texas.

Houston County lies in the West Gulf geomorphic province (Hunt, 1974; Walker and Coleman, 1987) in which the surface formations dip to the Gulf of Mexico at less than 2 degrees and crop out in Gulf Coast paralleling bands. The geology of the area is depicted on the adjacent Beaumont and Palestine Sheets of the geologic atlas of Texas and on the geologic map of Texas (University of Texas, 1992a, 1992b, and 1993).

All bedrock outcrops in the county are Eocene in age. The Eocene epoch is estimated to encompass the time span from about 58 million to about 37 million years before the present. The oldest outcrop in the county is the Queen City Sand of the Claiborne Group. Younger formations in the Claiborne Group are, from the oldest to youngest, the Weches Formation, the Sparta Sand, and the Yegua Formation. Three lower formations in the overlying Jackson Group, the Cook Mountain, the Caddell Formation, and the Wellborn Formation, are last in sequence of Eocene formations in the county.

Quaternary surficial deposits parallel the major streams as Pleistocene terrace substrate and Holocene flood plain sand deposits. These deposits are probably less than 2.6 million years old. Thin sediment deposits, probably Pliocene age, overlie portions of older Eocene bedrock surfaces on interfluves. An indication of these sediments’

pre-Pleistocene age is that they are not in clearly defined stream-paralleling terrace positions.

Tertiary formations in east Texas and the Gulf Coast record a sequence of marine transgressions and regressions in Houston County. A transgression is an advance of the sea over land area. A transgression results in a decrease in land area and an increase in marine sediment deposition. A regression is a retreat of the sea, resulting in an increase in deltaic and fluvial deposition and greater land area (Galloway and others, 1991). Transgressions and regressions can result from vertical changes in the elevation of the continents, changes in the volume of the ocean basins or the volume of seawater, and from coastal erosion or deposition.

The nearshore, shallow-water marine Queen City Sand and Weches Formation represent transgressions followed by the regressive delta and delta-plain Sparta Sand. The Cook Mountain Formation is a transgressive marine deposit that overlaps the Sparta Sand. The Yegua Formation, locally regressive and fluvial, overlies the Cook Mountain Formation (Jackson and Garner, 1982). The prodeltiac Caddell Formation and delta front Wellborn Formation generally represent a gradually regressing sea (Fisher and others, 1970).

A fault is about a mile south of the northwestern county boundary west of U.S. Highway 287 (University of Texas, 1993). This normal fault, downthrown to the north, is part of the Elkhart Graben. It has effected some minor displacements in the Sparta Sand and Weches Formation outcrops.

The county straddles the drainage divide between the Neches River and Trinity River, which delineate the eastern and western county margins, respectively. The eastern part of the county drains into the Neches River, and the western part drains into the Trinity River.

The relationship between the bedrock outcrops and their superincumbent soils is complex. Some formations lack definitive or unique lithologies. Some soil sola, even C horizon material, may be genetically unrelated to the underlying formations. The uppermost strata in which the soils have developed may be late Tertiary or Quaternary age, and may be of eolian, colluvial, or fluvial origin.

The general northeast-southwest trend of the general soil map units, however, parallel a similar trend in the strike of the Eocene formation outcrops.

The general soil map, which is at the back of this publication, will be used as an initial point of departure in discussing geologic strata and associated soils.

Eocene Formations and Related Soils

Queen City Sand. The Queen City Sand outcrop area is small. It is confined largely to the drainage basin of Elkhart Creek in the northwestern part of the county and to Pedro Creek in the northeastern part of the county. It is mostly quartz sand with thin beds of clay and is locally glauconitic, an indication of marine facies. Ironstone concretions are common (University of Texas, 1993). The formation is of tidal embayment, tidal delta, and barrier island origin (Hobday, 1980; Hobday and others, 1980).

The Cuthbert-Kirvin-Lilbert and Freestone-Latex-Annona general soil map units developed in the Queen City Sand outcrop area. The Freestone-Latex-Annona map unit occurs mostly on stream terraces along the Trinity River and Neches River and may be a remnant of a late Pliocene or early Pleistocene fluvial deposit.

Weches Formation. The Weches Formation is less than 100 feet thick and crops out only in narrow bands along the margins of the Queen City Sand and the Sparta Sand. It was laid down in a shallow, near-shore marine depositional environment (Galloway and others, 1991). It is a locally, cross-bedded glauconitic quartz sand with clay and marl layers. Weathering has resulted in numerous ironstone concretions.

Soils mapped over the Weches Formation are in the Alto-Trawick general soil map unit. The reddish colors and ironstone concretions in these soils are derived from iron-rich glauconite.

Sparta Sand. The Sparta Sand is mainly quartz sand with some lignitic clay and silt layers. The formation belongs to a delta plain facies of gulf-ward flowing paleo-streams entering the county from the northeast. This subaerial part of a delta contains distributary channel cross-bedded sandstones and adjacent interdistributary mudstones (Ricoy and Brown, 1977).

The Lilbert-Betis-Darco general soil map unit is confined to the Sparta Sand outcrop. Part of the Cuthbert-Kirvin-Lilbert general soil map unit also covers part of the Sparta Sand outcrop area. Betis, Grapeland, and Tonkawa soils have sandy substrates that may be of distributary origin. Other soils are of interdistributary origin.

Cook Mountain Formation. Clays, marls, and sands, some lignitic and glauconitic, are the principal lithologies. Glauconite and marine fossils indicate a marine origin for the Cook Mountain Formation. The formation has several members that are not differentiated on the geologic map (University of Texas, 1993). Also, the Stone City Formation, which is not mapped east of the Trinity River, is included in

the Cook Mountain Formation outcrop area. The Stone City Formation underlies the Cook Mountain Formation and overlies the Sparta Sand.

The Cook Mountain Formation outcrop is overlain by several general soil map units—the Woodtell-Etoile, the Cuthbert-Kirvin-Lilbert, and the Freestone-Latex-Annona. The Freestone-Latex-Annona general soil map unit, as in the Queen City Sand outcrop area, may be a remnant of a late Pliocene or early Pleistocene fluvial deposit.

Yegua Formation. The Yegua Formation, the youngest unit of the Claiborne Group, has the largest outcrop area of any formation in the county. It is of fluvio-deltaic origin (Jackson and Garner, 1982; Fisher and others, 1970; Ahr, 1979) and is the product of regression over the Cook Mountain Formation. Lithologies are clay, quartz sand, and lignite.

The Kurth-Fuller-Keltys and the Fuller-Penning-Herty general soil map units developed on the Yegua Formation. Almost all of the soils, with the possible exception of Kurth soils, have claystone, mudstone, or shale substrates. The Kurth and the Herty substrates may be of fluvial channel or delta distributary origin. Surface materials here indicate a paleo-drainage system or local eolian depositional origin.

Caddell Formation and Wellborn Formation. The Caddell Formation and the Wellborn Formation are the older strata in the Jackson Group. Both formations have lithologies of clay and quartz sand with some glauconite and lignite. The Caddell Formation has a higher percentage of clay than the Manning Formation. The Caddell Formation is prodelta in origin. The Wellborn Formation origin is delta front (Fisher and others, 1970).

The Cadell and Wellborn Formation have only small outcrops in the county. They crop out mainly along the southeastern county margin within the Herty-Moswell-Fuller general soil map unit.

Terraces and Pliocene-Pleistocene Upland Sediment

A stream terrace can be defined as a remnant of a former flood plain which is now abandoned and elevated above the present day active flood plain. Sediment deposits beneath terrace surfaces may have a size range and fluvial facies similar to that of the subadjacent active channel. Older terraces may be gullied and dissected by streams, with diminished to obliterated original surface fluvial patterns.

The beginning of the Pleistocene epoch has been estimated to be about 1.6 to 2.6 million years before the present (Beard and others, 1982; Galloway and others, 1991). Terraces intermediate in elevation between a flood plain and an upland are assumed to be Pleistocene age. Terraces in the absence of adjacent flood plains and uplands imply a lowering and inversion of the original fluvial topography. These surfaces are probably late Tertiary age and, consequently, older than the range of beginning dates for the Pleistocene epoch.

The age of the Deweyville Formation is controversial. Radiocarbon dates indicate an age ranging from more than 30,000 years before the present to as young as 17,000 years before the present (Bernard and LeBlanc, 1965). Even younger dates of less than 10,000 years before the present have been reported (Alford and Holmes, 1985). The age of the Beaumont Formation is likewise inconclusive. Estimates range from about 30,000 years to over 100,000 years before the present.

The Freestone-Latex-Annona and Eastham-Garner-Hallsbluff general soil map units in Houston County are located on terraces along the Trinity River and Neches River. The Freestone-Latex-Annona general soil map unit is also delineated in northeast trending bands on stream divides in upland outcrop areas of some Eocene formations. These interfluve soils may overlie remnants of once more extensive late Pliocene and early Pleistocene age fluvial sediments. These extensive fluvial sediments would have been deposited by a now-vanished stream network at variance with the present-day stream network.

The mounded Moten-Multey complex soil map unit on the Yegua Formation outcrop may be of similar origin. Upland indications of paleo-drainages were described in the Angelina County and Madison County Soil Surveys (Aronow, 1988 and 1993).

Eolian upland deposition derived from local existing flood plains is also a possible origin. The terraces in the southwest corner of the county along the Trinity River cross the boundary of the Beaumont Sheet and Palestine Sheet of the Geologic Atlas of Texas (University of Texas, 1992a and 1993). These terraces and formations are correlated downstream across geologic atlas sheet boundaries. The lowest terraces in this southwestern locale is correlated with the Deweyville Formation age terraces which occur to the south along the Trinity River and Neches River (University of Texas, 1982 and 1992a). The higher terraces are correlated with the Beaumont Formation, which is mainly an extensive coast-paralleling formation (University of Texas, 1982). The Deweyville Formation exhibits in many places a relict fluvial morphology. Abandoned meander loops and meander

scars cut into the margins of higher deposits. The Deweyville Formation also displays relict point bars larger than those contemporary to the subadjacent Holocene age streams. These features probably indicate higher stream discharges in the past.

Terraces to the north, however, are uncorrelated and include surfaces at varying elevations. The lowest terraces upstream are probably Deweyville Formation age as identified by the relict fluvial features. The clayey Eastham-Garner-Hallsbluff general soil map unit is probably developed on paleo-flood basin and paleo-oxbow lake sediments.

North of the great eastward bend in the Trinity River, well defined to poorly defined tread and riser morphology is displayed at lower altitudes within the Freestone-Latex-Annona general soil map unit. The lowest terrace level is surfaced with very large relict Deweyville Formation point bars. To the northeast, the Freestone-Latex-Annona general soil map unit occupies stream divide positions on the outcrop of the Cook Mountain Formation. The Freestone-Latex-Annona general soil map unit in these locations may be evidence of an ancient paleo-drainage system.

The terraces of the Freestone-Latex-Annona general soil map unit in the northwestern part of the county are more extensive than shown on the geologic map of Texas (University of Texas, 1993) and overlie part of the Queen City Formation outcrop. Portions of the lowest terrace level in the northern group have a relict fluvial morphology, indicating a Deweyville Formation age. Also, terraces along the Neches River, as indicated by the Freestone-Latex-Annona general soil map unit delineation, are of greater areal extent than indicated on the geologic map of Texas (University of Texas, 1993).

Several eastern and northeastern trends of the Freestone-Latex-Annona general soil map unit are present along Hickory Creek and San Pedro Creek in the eastern part of the county. This map unit is located on terraces along Hickory Creek or on eolian sediments derived locally from the creek flood plain. A local sediment origin from the Pedro Creek flood plain is doubtful; however, an eolian derivation is possible. As in other locales, these sediments probably were deposited by a paleo-drainage system. The San Pedro Creek terraces are over outcrops of the Queen City Sand, Weches Formation, and Sparta Sand. The Hickory Creek terraces are on outcrops of the Sparta Sand and Cook Mountain Formation.

Pimple Mounds

Pimple mounds are enigmatic circular to elliptical knolls, 20 to 80 feet in diameter, and less than 4 feet in height. They are also known as prairie and mima mounds outside the Gulf Coast and east Texas region. They are restricted to areas west of the Mississippi River and are found from south Texas to Washington (Cox, 1984). They occur mainly on late Pliocene, Pleistocene, and Holocene surfaces. Their time of origin was probably Pleistocene to Holocene.

The mounded soils in Houston County, which occur also in non-mounded form, include the Besner, Freestone, Latex, and Multey soils. These soils are mapped in complexes—Alazan-Besner, Bernaldo-Besner, Freestone-Derly, Mollville-Besner, Moten-Multey, and Sawlit-Latex. The intermound soil complexes, such as the Alazon and Derly, cover larger areas than the mounds. Where soils occur in mounded and non-mounded form, the A and E horizons are generally thicker. Most mounded soils in complexes have thicker A and E horizons than the intermound soils.

Theories of the origin of pimple mounds have generated an immense and diverse literature (Washburn, 1988). Hypotheses for the genesis of pimple mounds include:

(1) Residual hillocks left after wind erosion, sheet flood erosion, and fluvial erosion.
(2) Accumulations of wind-transported sand, silt, or clay pellets or chips around clumps of vegetation.
(3) Eolian accumulations whose sites were started by, or topographically enhanced by, erosional processes.
(4) The result of the “fluffing up,” or the decreasing of the bulk densities, of solum materials and the lateral or centripetal transport of surface materials by burrowing animals, such as pocket gophers, with possible eolian increments.
(5) Very modified hillocks in areas of former permafrost produced by freezing and thawing of surface materials (cryoturbation processes).
(6) The result of seismic (earthquake) vibration of silty and sandy surface materials.
(7) Accumulations around or modifications of tree-tip mounds or cradle knolls.

Some of these hypotheses, such as (5) and (6), seem unlikely for east Texas or the Gulf Coast. All of the others are potentially applicable and, in one form or another, have been suggested for mound origin in east Texas and the Gulf Coast.

Hypotheses (3) and (4) involving eolian effects seem the most plausible for east Texas and the Gulf Coast. Eolian accumulation suggests a partly non-pedogenic origin for the thickened A and E horizons and perhaps drier climates than at present. It should

be noted that the descriptions of the Multey and Sawlit soils refer to their surfaces as “wind modified.”

Holocene Alluvium

The term “Holocene” has been defined as covering the past 10,000 years (Hopkins, 1975). Locally, this is the time of flood plain sediment deposition along streams. These streams include the Neches River, Trinity River, and their tributaries.

The Pophers-Koury, Texark-Kaufman, and Laneville-Nahatche-Hannahatchee general soil map units have developed in Holocene alluvium.

References

Ahr, W.M. 1979. Depositional environments of the Claiborne Group. *In* Claiborne sediments of the Brazos valley, southeast Texas (field trip guidebook). Houston Geological Society, D.G. Kersey, editor, pp. 12-13.

Alford, J.J. and J.C. Holmes. 1985. Meander scars as evidence of major climatic change in southwest Louisiana: annals of the Association of American Geographers, volume 75, pp. 395-403.

American Association of State Highway and Transportation Officials (AASHTO). 1986. Standard specifications for highway materials and methods of sampling and testing. 14th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 1993. Standard classification of soils for engineering purposes. ASTM Standard D 2487.

Aronow, Saul. 1988. Surface geology. *In* Soil survey of Angelina County, Texas, U.S. Department of Agriculture, Natural Resources Conservation Service, Raymond Dolozel, pp. 114-121.

Aronow, Saul. 1993. Surface geology. *In* Soil survey of Madison County, Texas, U.S. Department of Agriculture, Natural Resources Conservation Service, C.L. Neitsch, pp. 109-113.

Beard, J.H., G.B. Sangree, and L.A. Smith. 1982. Quaternary geochronology, paleoclimate, depositional sequences, and eustatic cycles. American Association of Petroleum Geologists Bulletin, volume 66, pp. 158-169.

Bernard, H.A. and R.J. LeBlanc. 1965. Resume of the Quaternary of the Northwestern Gulf of Mexico Province. *In* The Quaternary of the United States, H.E. Wright and D.G. Frey, editors, Princeton University Press, pp. 137-185.

Birkeland, Peter W. 1984. Soils and geomorphology. 2nd edition.

Black, C.C. 1968. Soil-plant relationships. 2nd edition.

Broadfoot, Walter M. and R.M. Krinard. 1959. Guide for evaluation of sweetgum sites. U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Occas. Paper 176.

Broadfoot, Walter M. 1963. Guide for evaluating water oak sites. U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station, Res. Paper SO-1.

Broadfoot, Walter M. 1964. Soil suitability for hardwoods in the midsouth. U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station, Res. Note SO-10.

Cox, G.W. 1984. Mounds of mystery. *In* Natural History, volume 93, number 6, pp. 36-45.

Fisher, W.L., C.V. Proctor, W.E. Galloway, and J.S. Nagle. 1970. Depositional systems in the Jackson Group of Texas—their relationship to oil, gas, and uranium. University of Texas, Bureau of Economic Geology, Geologic Circular 70-4.

Galloway, W.E., D.G. Bebout, W.L. Fisher, G.B. Dunlap, R. Cabrera-Castro, J.E. Lugo-Rivera, and T.M. Scott. 1991. Cenozoic. *In* The Gulf of Mexico Basin: Boulder, Amos Salvador, editor, Geological Society of America, the Geology of North America, volume J, pp. 245-324.

Hobday, D.K. 1980. Geology of the Queen City Formation and associated units. *In* Middle Eocene coastal plain and nearshore deposits of east Texas: a field guide to the Queen City Formation and related papers, Austin, B.F. Perkins and D.K. Hobday, editors, Earth Enterprises, Inc., pp. 1-45.

Hobday, D.K., R.A. Morton, and E.W. Collins. 1980. The Queen City Formation in the east Texas embayment—a depositional record of riverine, tidal, and wave interaction. University of Texas, Bureau of Economic Geology, Geological Circular 80-4.

Hopkins, D.M. 1975. Time-stratigraphic nomenclature for the Holocene Epoch. Geology, number 3, 10 pp.

Hunt, C.B. 1974. Natural regions of the United States and Canada: San Francisco. W.H. Freeman and Co.

Jackson, M.L.W. and L.E. Garner. 1982. Environmental geology of the Yegua-Jackson lignite belt, southeast Texas. University of Texas, Bureau of Economic Geology, Report of Investigations 129.

Olson, D.J. 1959. Site index curves for upland oak in the southeast. U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station Res. Note 125.

Ricoy, J.U. and L.F. Brown. 1977. Depositional systems in the Sparta Formation (Eocene) Gulf Coast Basin of Texas. University of Texas, Bureau of Economic Geology, Geological Circular 77-7.

Sellards, E.H., W.S. Adkins, and F.B. Plummer. 1932. Geology of Texas, stratigraphy, volume 1, University of Texas, Bulletin Number 3232.

Texas Crop and Livestock Reporting Service. 1983. Texas livestock, dairy, and poultry statistics. Texas Department of Agriculture, U.S. Department of Agriculture, ESCS publication, 60 pp., illus.

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook. Soil Survey Staff, Title 430-VI. (Available in the State Office of the Natural Resources Conservation Service at Temple, Texas.)

United States Department of Agriculture, Soil Conservation Service. National engineering handbook. (Available in the State Office of the Natural Resources Conservation Service at Temple, Texas.)

United States Department of Agriculture, Soil Conservation Service. National forestry manual. (Available in the State Office of the Natural Resources Conservation Service at Temple, Texas.)

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of Agriculture, Soil Conservation Service. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. U.S. Department of Agriculture Handbook 436.

United States Department of Agriculture, Soil Conservation Service. 1981. Land resource regions and major land resource areas of the United States. U.S. Department of Agriculture Handbook 296.

United States Department of Agriculture. 1984. Procedures for collecting soil samples and methods of analysis for soil survey. Soil Survey Investigation Report 1, 68 pp., illus.

United States Department of Agriculture, Soil Conservation Service. 1991. Soil survey laboratory methods manual. Soil Survey Investigation Report 42.

United States Department of Agriculture. 1992. Keys to soil taxonomy. 5th edition. Natural Resources Conservation Service, Soil Survey Staff.

United States Department of Agriculture. 1993. Soil survey manual. Soil Conservation Service, Soil Survey Staff, U.S. Department of Agriculture Handbook 18.

University of Texas, Bureau of Economic Geology. 1982. Geologic atlas of Texas, Houston sheet, 2nd edition, scale 1:25,000,000.

University of Texas, Bureau of Economic Geology. 1992a. Geologic atlas of Texas, Beaumont sheet, 2nd edition, scale 1:250,000.

University of Texas, Bureau of Economic Geology. 1992b. Geologic map of Texas, scale: 1:500,000.

University of Texas, Bureau of Economic Geology. 1993. Geologic atlas of Texas, Palestine sheet, 2nd edition, scale 1:250,000.

Walker, H.J. and J.M. Coleman. 1987. Atlantic and Gulf coastal plain. *In* Geomorphic systems of North America, Centennial Special Volume 2: Boulder, W.L. Graf, editor, Geological Society of America, pp. 51-110.

Washburn, A.L. 1988. Mima mounds—an evaluation of proposed origins with special reference to the Puget Lowlands. Washington Division of Geology and Earth Resources Report of Investigations 29.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Absorbants. Substances used in seedling root treatments for the purpose of holding and drawing moisture.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottomland. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clayey soil. Silty clay, sandy clay, or clay.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Crowning. A road construction method in which the road surface is built higher in the center than on either side for the purpose of shedding surface water runoff.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deadening. A method of timber stand improvement

in which the trees to be killed are injected with chemicals.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to bedrock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Doyle Rule. A widely used mathematical formula that gives board foot yields from logs based on diameter and length. For 16-foot logs, volume, in board feet, equals the diameter of the log minus 4 squared.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Glauconite. A greenish micaceous mineral consisting essentially of potassium, aluminum, and iron that weathers to an olive yellow, yellow, or reddish weakly consolidated material high in iron.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after

prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Ironstone. An extremely hard reddish or dark brown material formed by the secondary precipitation of iron.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Krotovina. A former animal burrow in one soil horizon that has been filled with organic matter or material from another horizon.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mound. A low rounded hill of earth.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth’s surface; the loose earth material above the solid rock.

Release. The removal of all plants competing with or overtopping desirable seedlings.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material

that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Roller chopping. A site preparation method in which competing vegetation is chopped by pulling a rolling drum with attached cutting blades over it.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Site preparation. Preparing an area of land for planting, direct seeding, or natural regeneration of trees by clearing, chemical vegetation control, burning, disking, chopping, bedding, windrowing, raking, or a combination thereof.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty

or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 1 percent
Very gently sloping to	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 45 percent

Classes for complex slopes are as follows:

Nearly level	0 to 3 percent
Gently undulating	1 to 5 percent
Undulating	1 to 8 percent
Rolling	5 to 10 percent
Hilly	10 to 20 percent
Steep	20 to 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stand improvement. The control of plants that are undesirable, either because of species, form, or competition to desirable plants, for the purpose of improving a stand's composition, growth, or condition.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Streamside management zone. An area of 50 or more feet on both sides of a stream where extra precaution is needed in carrying out forest practices in order to protect streambank edges and water quality.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the

next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Underplanting. A regeneration method in which seedlings are planted beneath existing trees and brush. A follow-up operation to release the seedlings will be needed.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth’s surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of

coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Crockett, Texas)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	56.7	34.1	45.4	79	12	229	3.42	1.26	5.21	6	.5
February----	61.4	37.3	49.3	82	19	289	2.84	1.74	3.83	5	.1
March-------	69.9	44.9	57.4	86	24	543	3.20	1.58	4.60	5	0.0
April-------	77.7	53.7	65.7	89	33	772	4.10	1.40	6.34	4	0.0
May---------	83.8	61.2	72.5	93	45	1,005	4.37	1.97	6.42	5	0.0
June--------	89.7	67.9	78.8	98	55	1,165	3.68	1.47	5.54	5	0.0
July--------	93.5	70.8	82.2	102	62	1,309	2.89	0.88	4.52	4	0.0
August------	94.4	70.1	82.3	104	60	1,265	2.33	0.66	3.67	4	0.0
September---	88.4	65.5	76.9	100	47	1,109	4.45	1.93	6.60	5	0.0
October-----	80.0	54.1	67.0	92	35	807	3.43	1.12	5.53	4	0.0
November----	69.3	44.9	57.1	86	25	515	3.79	1.92	5.42	5	0.1
December----	60.5	37.0	48.7	80	15	310	3.58	1.95	5.01	6	0.2
Yearly:											
Average---	77.1	53.5	65.3	---	---	---	---	---	---	---	---
Extreme---	108	---	---	104	10	---	---	---	---	---	---
Total-----	---	---	---	---	---	9,318	42.06	34.51	49.11	58	0.9

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (threshold: 40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Crockett, Texas)

Probability	Temperature 24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 5	Mar. 20	Mar. 30
2 years in 10 later than--	Feb. 26	Mar. 14	Mar. 25
5 years in 10 later than--	Feb. 11	Mar. 1	Mar. 16
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 19	Nov. 10	Oct. 27
2 years in 10 earlier than--	Nov. 28	Nov. 18	Nov. 3
5 years in 10 earlier than--	Dec. 16	Dec. 4	Nov. 16

Table 3.--Growing Season

(Recorded in the period 1961-90 at Crockett, Texas)

Probability	Daily minimum temperature during growing season: Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	272	246	226
8 years in 10	280	254	232
5 years in 10	294	270	245
2 years in 10	309	286	258
1 year in 10	316	294	265

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AaB	Alazan very fine sandy loam, 0 to 2 percent slopes	7,866	1.0
AbA	Alazan-Besner complex, 0 to 2 percent slopes	7,545	1.0
AfB	Alto fine sandy loam, 1 to 3 percent slopes	11,292	1.4
AnA	Annona loam, 0 to 1 percent slopes	11,499	1.5
AnB	Annona loam, 1 to 3 percent slopes	8,027	1.0
AtB	Attoyac fine sandy loam, 1 to 3 percent slopes	3,136	0.4
AuB	Austonio fine sandy loam, 1 to 3 percent slopes	3,710	0.5
AuD	Austonio fine sandy loam, 5 to 15 percent slopes	5,514	0.7
BaB	Bernaldo fine sandy loam, 1 to 3 percent slopes	7,217	0.9
BbA	Bernaldo-Besner complex, 0 to 2 percent slopes	1,627	0.2
BeA	Besner fine sandy loam, 0 to 2 percent slopes	4,290	0.5
BtC	Betis loamy fine sand, 1 to 5 percent slopes	19,540	2.4
BwB	Bowie fine sandy loam, 1 to 3 percent slopes	6,136	0.8
ChA	Chireno loam, 0 to 1 percent slopes	1,341	0.2
CtE	Cuthbert fine sandy loam, 5 to 15 percent slopes	33,184	4.2
CtG	Cuthbert fine sandy loam, 15 to 35 percent slopes	1,385	0.2
CuE	Cuthbert gravelly fine sandy loam, 5 to 15 percent slopes	1,172	0.1
DaC	Darco loamy fine sand, 1 to 8 percent slopes	19,892	2.5
DaE	Darco loamy fine sand, 8 to 15 percent slopes	6,601	0.8
EaA	Eastham clay, 0 to 1 percent slopes	2,436	0.3
EaB	Eastham clay, 1 to 3 percent slopes	2,299	0.3
ErB	Elrose fine sandy loam, 1 to 3 percent slopes	3,974	0.5
EtB	Etoile loam, 1 to 3 percent slopes	14,224	1.8
FrB	Freestone fine sandy loam, 1 to 3 percent slopes	17,186	2.1
FsA	Freestone-Derly complex, 0 to 2 percent slopes	18,513	2.3
FuA	Fuller fine sandy loam, 0 to 1 percent slopes	2,672	0.3
FuB	Fuller fine sandy loam, 1 to 3 percent slopes	55,837	7.0
GaA	Garner clay, 0 to 1 percent slopes	2,653	0.3
GrB	Grapeland fine sand, 1 to 4 percent slopes	3,902	0.5
HaA	Hainesville fine sand, 0 to 2 percent slopes	5,248	0.6
HbC	Hallsbluff clay loam, 2 to 5 percent slopes	1,747	0.2
Hc	Hannahatchee fine sandy loam, frequently flooded	3,669	0.5
HeA	Herty loam, 0 to 1 percent slopes	1,388	0.2
HeB	Herty loam, 1 to 3 percent slopes	30,489	3.9
Iu	Iulus fine sandy loam, frequently flooded	7,717	1.0
Ka	Kaufman clay, occasionally flooded	11,206	1.4
Kb	Kaufman clay, frequently flooded	2,496	0.3
KcE	Kellison loam, 5 to 15 percent slopes	2,094	0.3
KeB	Keltys fine sandy loam, 1 to 3 percent slopes	19,388	2.4
KeD	Keltys fine sandy loam, 5 to 8 percent slopes	679	0.1
KfC	Kirvin fine sandy loam, 2 to 5 percent slopes	21,653	2.7
KgC	Kirvin gravelly fine sandy loam, 2 to 5 percent slopes	2,761	0.3
KhC	Kirvin soils, graded, 2 to 8 percent slopes	1,015	0.1
Ko	Kosse sandy clay loam, occasionally flooded	7,724	1.0
Kp	Koury silt loam, frequently flooded	17,896	2.3
KuB	Kurth fine sandy loam, 1 to 3 percent slopes	59,714	7.5
KuD	Kurth fine sandy loam, 5 to 8 percent slopes	11,005	1.4
LaA	LaCerda clay loam, 0 to 1 percent slopes	2,096	0.3
LaB	LaCerda clay loam, 1 to 3 percent slopes	5,527	0.7
LaE	LaCerda clay loam, 5 to 15 percent slopes	467	0.1
Lc	Laneville loam, frequently flooded	14,769	1.9
LeB	Latex loam, 1 to 3 percent slopes	19,187	2.4
LtC	Lilbert loamy fine sand, 2 to 5 percent slopes	26,055	3.3
LvC	Lovelady loamy sand, 1 to 5 percent slopes	6,304	0.8
LvD	Lovelady loamy sand, 5 to 8 percent slopes	1,521	0.2
MoA	Mollville loam, 0 to 1 percent slopes	751	0.1
MpA	Mollville-Besner complex, 0 to 2 percent slopes	3,773	0.5
MsB	Moswell loam, 1 to 3 percent slopes	13,336	1.7
MsE	Moswell loam, 5 to 15 percent slopes	11,080	1.4
MxA	Moten-Multey complex, 0 to 2 percent slopes	21,934	2.8
NaG	Naclina clay loam, 15 to 35 percent slopes, eroded	101	*
Nc	Naconiche mucky sandy loam, 0 to 2 percent slopes	851	0.1

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
Nh	Nahatche loam, frequently flooded	7,380	0.9
Oz	Ozias-Pophers complex, frequently flooded	9,276	1.2
PeB	Penning very fine sandy loam, 0 to 4 percent slopes	21,375	2.7
PnA	Percilla clay loam, 0 to 1 percent slopes	421	0.1
Po	Pophers silt loam, frequently flooded	16,406	2.1
PsA	Portersprings fine sandy loam, 0 to 1 percent slopes	3,939	0.5
RnB	Rentzel loamy fine sand, 0 to 4 percent slopes	13,114	1.7
SaB	Sacul fine sandy loam, 1 to 3 percent slopes	7,338	0.9
SwA	Sawlit-Latex complex, 0 to 2 percent slopes	7,581	1.0
TaE	Tenaha loamy fine sand, 5 to 15 percent slopes	18,004	2.3
Te	Texark clay, occasionally flooded	10,771	1.4
Tf	Texark clay, frequently flooded	4,344	0.5
ToC	Tonkawa fine sand, 0 to 8 percent slopes	802	0.1
TrE	Trawick fine sandy loam, 5 to 15 percent slopes	11,891	1.5
TwC	Trawick gravelly fine sandy loam, 2 to 5 percent slopes	2,728	0.3
TwE	Trawick gravelly fine sandy loam, 5 to 15 percent slopes	625	0.1
TxG	Trawick-Bub complex, 15 to 40 percent slopes	1,284	0.2
WnB	Woden fine sandy loam, 1 to 3 percent slopes	1,644	0.2
WoB	Woodtell very fine sandy loam, 1 to 3 percent slopes	19,001	2.4
WoE	Woodtell very fine sandy loam, 5 to 15 percent slopes	11,743	1.5
	Water	1,664	0.2
	Total	791,642	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Soil name and map symbol	Land capability	Grain sorghum	Cotton	Peanuts	Watermelons	Common bermudagrass	Bahiagrass	Improved bermudagrass
		Bu	Lbs	Lbs	Tons	AUM*	AUM*	AUM*
AaB------------- Alazan	IIw	---	---	---	---	7.0	7.0	8.0
AbA:								
Alazan---------	IIw	---	---	---	---	7.0	7.0	8.0
Besner---------	IIe	80	---	---	---	6.0	7.0	8.0
AfB------------- Alto	IIe	---	500	---	---	5.0	6.0	6.0
AnA**----------- Annona	IIIw	55	---	---	---	5.0	5.0	6.0
AnB------------- Annona	IIIe	55	---	---	---	5.0	5.0	6.0
AtB------------- Attoyac	IIe	---	---	2,500	12	6.0	7.0	9.0
AuB------------- Austonio	IIe	70	---	---	15	7.0	8.0	8.0
AuD------------- Austonio	VIe	---	---	---	---	5.0	7.0	8.0
BaB------------- Bernaldo	IIe	70	---	2,500	11	7.0	8.0	8.0
BbA:								
Bernaldo-------	IIe	70	---	2,500	11	7.0	8.0	8.0
Besner---------	IIe	80	---	---	---	6.0	7.0	8.0
BeA------------- Besner	IIe	80	---	---	---	6.0	7.0	9.0
BtC------------- Betis	IIIs	---	---	1,700	10	---	---	6.0
BwB------------- Bowie	IIe	---	---	---	11	5.0	6.0	7.0
ChA------------- Chireno	IIs	---	---	---	---	8.0	8.0	9.0
CtE------------- Cuthbert	VIe	---	---	---	---	2.0	2.0	4.0
CtG------------- Cuthbert	VIIe	---	---	---	---	---	---	---
CuE------------- Cuthbert	VIe	---	---	---	---	1.0	1.0	3.0
DaC------------- Darco	IVe	---	---	1,000	11	---	---	6.0

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Grain sorghum	Cotton	Peanuts	Watermelons	Common bermudagrass	Bahiagrass	Improved bermudagrass
		Bu	Lbs	Lbs	Tons	AUM*	AUM*	AUM*
DaE------------- Darco	VIe	---	---	---	---	---	---	3.0
EaA------------- Eastham	IIw	90	600	---	---	---	---	8.0
EaB------------- Eastham	IIe	90	550	---	---	---	---	8.0
ErB------------- Elrose	IIe	---	---	---	10	7.0	8.0	8.0
EtB------------- Etoile	IIIe	---	---	---	---	5.0	6.0	6.0
FrB------------- Freestone	IIe	---	400	---	---	7.0	8.0	8.0
FsA:								
Freestone------	IIe	---	400	---	---	7.0	8.0	8.0
Derly----------	IIIw	---	260	---	---	---	3.0	---
FuA------------- Fuller	IIIw	---	---	---	---	3.0	4.0	5.0
FuB------------- Fuller	IIIe	---	---	---	---	3.0	4.0	5.0
GaA------------- Garner	IIIw	65	---	---	---	5.0	5.0	8.0
GrB------------- Grapeland	IIIs	---	---	2,400	9	---	---	6.0
HaA------------- Hainesville	IIIs	---	---	---	---	---	---	6.0
HbC------------- Hallsbluff	IIIe	75	500	---	---	---	---	8.0
Hc-------------- Hannahatchee	Vw	---	---	---	---	---	---	6.0
HeA------------- Herty	IIIw	---	---	---	---	---	5.0	6.0
HeB------------- Herty	IIIe	---	---	---	---	---	5.0	6.0
Iu-------------- Iulus	Vw	---	---	---	---	---	7.0	7.0
Ka-------------- Kaufman	IIw	100	500	---	---	---	---	6.0
Kb-------------- Kaufman	Vw	---	---	---	---	---	---	5.0
KcE------------- Kellison	VIe	---	---	---	---	3.0	3.0	4.0

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Grain sorghum	Cotton	Peanuts	Watermelons	Common bermudagrass	Bahiagrass	Improved bermudagrass
		Bu	Lbs	Lbs	Tons	AUM*	AUM*	AUM*
KeB------------- Keltys	IIe	---	---	---	---	7.0	8.0	8.0
KeD------------- Keltys	IVe	---	---	---	---	6.0	6.0	7.0
KfC------------- Kirvin	IIIe	---	---	---	---	4.0	5.0	7.0
KgC------------- Kirvin	IVe	---	---	---	---	3.0	4.0	6.0
KhC------------- Kirvin	VIe	---	---	---	---	5.0	5.0	6.0
Ko-------------- Kosse	IIw	---	---	---	---	---	---	9.0
Kp-------------- Koury	Vw	---	---	---	---	7.0	8.0	8.0
KuB------------- Kurth	IIe	---	---	---	---	6.0	7.0	8.0
KuD------------- Kurth	IVe	---	---	---	---	6.0	6.0	7.0
LaA------------- LaCerda	IIIw	---	---	---	---	---	6.0	8.0
LaB------------- LaCerda	IIIe	---	---	---	---	---	6.0	8.0
LaE------------- LaCerda	VIe	---	---	---	---	---	4.0	4.0
Lc-------------- Laneville	Vw	---	---	---	---	---	6.0	8.0
LeB------------- Latex	IIe	---	---	---	11	7.0	8.0	9.0
LtC------------- Lilbert	IIIs	---	---	1,500	10	---	3.0	8.0
LvC------------- Lovelady	IIIs	---	---	---	---	4.0	5.0	8.0
LvD------------- Lovelady	IVe	---	---	---	---	3.0	4.0	8.0
MoA------------- Mollville	IVw	---	---	---	---	4.0	4.0	---
MpA:								
Mollville------	IVw	---	---	---	---	4.0	4.0	---
Besner---------	IIe	80	---	---	---	6.0	7.0	8.0
MsB------------- Moswell	IIIe	---	---	---	---	5.0	---	6.0

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Grain sorghum	Cotton	Peanuts	Watermelons	Common bermudagrass	Bahiagrass	Improved bermudagrass
		Bu	Lbs	Lbs	Tons	AUM*	AUM*	AUM*
MsE------------- Moswell	VIe	---	---	---	---	4.0	---	4.0
MxA:								
Moten----------	IIw	---	---	---	---	4.0	4.0	4.0
Multey---------	IIs	---	---	---	---	7.0	7.0	8.0
NaG------------- Naclina	VIe	---	---	---	---	---	---	---
Nc-------------- Naconiche	VIIw	---	---	---	---	---	---	---
Nh-------------- Nahatche	Vw	---	---	---	---	3.0	3.0	1.0
Oz:								
Ozias----------	Vw	---	---	---	---	1.0	3.0	1.0
Pophers--------	Vw	---	---	---	---	2.0	5.0	3.0
PeB------------- Penning	IIw	---	---	---	---	---	7.0	8.0
PnA------------- Percilla	IVw	---	---	---	---	---	6.0	3.0
Po-------------- Pophers	Vw	---	---	---	---	2.0	5.0	3.0
PsA------------- Portersprings	IIw	70	---	---	---	8.0	8.0	9.0
RnB------------- Rentzel	IIIw	---	---	---	---	3.0	6.0	7.0
SaB------------- Sacul	IIIe	80	---	---	---	6.0	7.0	7.0
SwA:								
Sawlit---------	IIw	---	---	---	---	6.0	8.0	9.0
Latex----------	IIe	---	---	---	11	7.0	8.0	9.0
TaE------------- Tenaha	VIe	---	---	---	---	3.0	3.0	5.0
Te-------------- Texark	IIIw	60	425	---	---	---	---	2.0
Tf-------------- Texark	Vw	---	---	---	---	---	---	---
ToC------------- Tonkawa	IVs	---	---	---	8	---	---	1.0
TrE------------- Trawick	VIe	---	---	---	---	---	---	5.0

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Grain sorghum	Cotton	Peanuts	Watermelons	Common bermudagrass	Bahiagrass	Improved bermudagrass
		Bu	Lbs	Lbs	Tons	AUM*	AUM*	AUM*
TwC------------- Trawick	IIIe	---	---	---	---	---	---	6.0
TwE------------- Trawick	VIe	---	---	---	---	---	---	4.0
TxG:								
Trawick--------	VIIe	---	---	---	---	---	---	---
Bub------------	VIIs	---	---	---	---	---	---	---
WnB------------- Woden	IIe	---	---	---	---	---	6.0	8.0
WoB------------- Woodtell	IIIe	70	300	---	---	3.0	4.0	6.0
WoE------------- Woodtell	VIe	---	---	---	---	3.0	3.0	4.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 6.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available.)

Soil name and map symbol	Woodland management group***	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
AaB----------- Alazan	7	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	95	380	Loblolly pine, sweetgum, cherrybark oak, green ash.
							Shortleaf pine------	87	340	
							Sweetgum-----------	95	260	
							Southern red oak----	---	---	
AbA**:										
Alazan-------	7	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	95	380	Loblolly pine, sweetgum, cherrybark oak, green ash.
							Shortleaf pine------	87	340	
							Sweetgum-----------	95	260	
							Southern red oak----	---	---	
Besner-------	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	91	330	Loblolly pine, sweetgum, southern red oak, white oak.
							Shortleaf pine------	82	270	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
AfB----------- Alto	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	88	330	Loblolly pine, sweetgum, southern red oak.
							Shortleaf pine------	80	270	
							Southern red oak----	---	---	
							Sweetgum-----------	---	---	
AnA**, AnB---- Annona	21	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	82	230	Loblolly pine, white ash, sweetgum, cherrybark oak.
							Shortleaf pine------	72	170	
							Sweetgum-----------	---	---	
AtB----------- Attoyac	6	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	95	380	Loblolly pine, sweetgum, southern red oak, white ash.
							Shortleaf pine------	87	340	
							Sweetgum-----------	95	260	
							Southern red oak----	---	---	
AuB----------- Austonio	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	88	330	Loblolly pine, sweetgum, southern red oak.
							Shortleaf pine------	80	270	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
AuD----------- Austonio	10	Moderate	Slight	Slight	Slight	Slight	Loblolly pine-------	88	380	Loblolly pine, sweetgum, southern red oak.
							Shortleaf pine------	80	270	
							Southern red oak----	---	---	
							Sweetgum-----------	---	---	
BaB----------- Bernaldo	6	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	93	380	Loblolly pine, sweetgum, southern red oak, white ash.
							Shortleaf pine------	85	340	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
BbA**:										
Bernaldo-----	6	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	93	380	Loblolly pine, sweetgum, southern red oak, white ash.
							Shortleaf pine------	85	340	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
Besner-------	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	91	330	Loblolly pine, sweetgum, southern red oak, white oak.
							Shortleaf pine------	82	270	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	

See footnote at end of table.

Table 6.--Woodland Management and Productivity--Continued

Soil name and map symbol	Woodland management group***	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
BeA----------- Besner	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	91	330	Loblolly pine, sweetgum, southern red oak, white oak.
							Shortleaf pine------	82	270	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
BtC----------- Betis	17	Slight	Severe	Moderate	Slight	Moderate	Loblolly pine-------	85	280	Loblolly pine.
							Shortleaf pine------	76	210	
BwB----------- Bowie	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	90	330	Loblolly pine, sweetgum, southern red oak.
							Shortleaf pine------	82	270	
ChA----------- Chireno	25	Slight	Slight	Moderate	Slight	Slight	Loblolly pine-------	75	180	Loblolly pine, water oak, sweetgum.
							Sweetgum-----------	68	130	
CtE----------- Cuthbert	20	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	82	230	Loblolly pine.
							Shortleaf pine------	75	170	
							Southern red oak----	---	---	
CtG----------- Cuthbert	22	Severe	Severe	Slight	Slight	Slight	Loblolly pine-------	83	230	Loblolly pine.
							Shortleaf pine------	74	170	
							Southern red oak----	---	---	
CuE----------- Cuthbert	20	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	82	230	Loblolly pine.
							Shortleaf pine------	75	170	
DaC, DaE------ Darco	17	Moderate	Severe	Moderate	Slight	Moderate	Loblolly pine-------	85	280	Loblolly pine.
							Shortleaf pine------	76	210	
							Post oak-----------	---	---	
EaA, EaB------ Eastham	28	Slight	Moderate	Severe	Slight	Slight	Water oak----------	70	60	Water oak, willow oak, green ash, pecan.
							Willow oak---------	70	60	
							Green ash----------			
ErB----------- Elrose	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	91	330	Loblolly pine, sweetgum, southern red oak, white ash.
							Shortleaf pine------	81	270	
							Sweetgum-----------	90	210	
							Southern red oak----	---	---	
EtB----------- Etoile	25	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	74	180	Loblolly pine.
							Shortleaf pine------	68	130	
							Southern red oak----	---	---	
							Sweetgum-----------	---	---	
FrB----------- Freestone	12	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	87	330	Loblolly pine, sweetgum, cherrybark oak.
							Shortleaf pine------	81	270	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
FsA**:										
Freestone----	12	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	87	330	Loblolly pine, sweetgum, cherrybark oak.
							Shortleaf pine------	81	270	
							Sweetgum-----------	---	---	

See footnote at end of table.

Table 6.--Woodland Management and Productivity--Continued

Soil name and map symbol	Woodland management group***	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
FsA**:										
Derly	24	Slight	Severe	Moderate	Slight	Severe	Sweetgum	80	120	Water oak, willow oak, sweetgum, green ash.
							Water oak	76	---	
							Willow oak	76	---	
FuA, FuB: Fuller	19	Slight	Severe	Moderate	Slight	Moderate	Loblolly pine	85	280	Loblolly pine, water oak, willow oak.
							Shortleaf pine	76	210	
							Sweetgum	---	---	
GaA: Garner	26	Slight	Moderate	Severe	Slight	Slight	Loblolly pine	77	230	Loblolly pine, southern red oak.
							Shortleaf pine	68	170	
							Southern red oak	---	---	
							Willow oak	---	---	
							Sweetgum	---	---	
GrB: Grapeland	17	Slight	Severe	Moderate	Slight	Moderate	Loblolly pine	85	280	Loblolly pine.
							Shortleaf pine	76	210	
HaA: Hainesville	8	Slight	Severe	Moderate	Slight	Severe	Loblolly pine	93	380	Loblolly pine.
							Shortleaf pine	87	340	
							Southern red oak	---	---	
HbC: Hallsbluff	28	Slight	Moderate	Severe	Slight	Slight	Water oak	70	60	Pecan, green ash, water oak, loblolly pine.
							Willow oak	70	60	
							Green ash	---	---	
Hc: Hannahatchee	2	Slight	Slight	Slight	Slight	Slight	Loblolly pine	102	430	America sycamore, black walnut, sweetgum, green ash.
							Sweetgum	100	310	
							Water oak	100	---	
HeA, HeB: Herty	21	Slight	Moderate	Moderate	Slight	Moderate	Loblolly pine	82	230	Loblolly pine, sweetgum, green ash, water oak.
							Shortleaf pine	73	170	
							Water oak	---	---	
							Southern red oak	---	---	
							Sweetgum	---	---	
Iu: Iulus	5	Slight	Moderate	Slight	Slight	Slight	Loblolly pine	100	430	Loblolly pine, sweetgum, water oak, cherrybark oak.
							Sweetgum	100	310	
							Water oak	100	---	
Ka, Kb: Kaufman	27	Slight	Moderate	Severe	Slight	Moderate	Willow oak	72	60	Willow oak, pecan, green ash, cottonwood.
							Green ash	65	---	
							Pecan	---	---	
							Hackberry	---	---	
KcE: Kellison	21	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine	80	230	Loblolly pine, sweetgum, southern red oak.
							Shortleaf pine	70	170	
							Southern red oak	---	---	
KeB: Keltys	18	Slight	Slight	Slight	Slight	Slight	Loblolly pine	85	280	Loblolly pine.
							Shortleaf pine	76	210	
							Sweetgum	---	---	
							Southern red oak	---	---	

See footnote at end of table.

Table 6.--Woodland Management and Productivity--Continued

Soil name and map symbol	Woodland management group***	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
KeD----------- Keltys	18	Moderate	Slight	Slight	Slight	Slight	Loblolly pine-------	85	280	Loblolly pine.
							Shortleaf pine------	76	210	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
KfC----------- Kirvin	18	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	85	280	Loblolly pine.
							Shortleaf pine------	75	210	
KgC----------- Kirvin	20	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	81	230	Loblolly pine.
							Shortleaf pine------	70	170	
KhC----------- Kirvin	31	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	64	95	Loblolly pine.
							Shortleaf pine------	56	60	
							Red oak------------	---	---	
Ko------------ Kosse	9	Slight	Moderate	Moderate	Slight	Moderate	Sweetgum-----------	95	260	Sweetgum, green ash, cherrybark oak.
							Green ash----------	---	---	
							Water oak----------	95	---	
Kp------------ Koury	1	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	104	430	Loblolly pine, sweetgum, water oak, green ash.
							Sweetgum-----------	103	310	
							Water oak----------	100	---	
							Green ash----------	80	---	
KuB, KuD------ Kurth	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	91	330	Loblolly pine, sweetgum, white ash, southern red oak.
							Shortleaf pine------	80	270	
							Sweetgum-----------	90	210	
							Southern red oak----	---	---	
LaA, LaB------ LaCerda	21	Slight	Moderate	Moderate	Slight	Moderate	Loblolly pine-------	81	230	Loblolly pine, green ash, sweetgum.
							Shortleaf pine------	73	170	
							Southern red oak----	---	---	
							Sweetgum-----------	---	---	
LaE----------- LaCerda	21	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine, sweetgum, white ash, southern red oak.
							Shortleaf pine------	70	170	
							Southern red oak----	---	---	
Lc------------ Laneville	5	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	100	430	Loblolly pine, sweetgum, water oak, cherrybark oak, green ash.
							Water oak----------	96	---	
							Sweetgum-----------	100	310	
LeB----------- Latex	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	91	330	Loblolly pine, sweetgum, southern red oak.
							Shortleaf pine------	82	270	
							Sweetgum-----------	90	210	
							Southern red oak----	---	---	
LtC----------- Lilbert	11	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	90	330	Loblolly pine.
							Shortleaf pine------	79	270	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
LvC, LvD------ Lovelady	16	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	84	280	Loblolly pine.
							Shortleaf pine------	76	210	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	

See footnote at end of table.

Table 6.--Woodland Management and Productivity--Continued

Soil name and map symbol	Woodland management group***	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
MoA----------- Mollville	23	Slight	Severe	Moderate	Slight	Severe	Loblolly pine------- Water oak----------- Willow oak---------- Sweetgum------------	82 80 80 80	230 --- --- 120	Water oak, sweetgum, loblolly pine, green ash, willow oak.
MpA**:										
Mollville----	23	Slight	Severe	Moderate	Slight	Severe	Loblolly pine------- Water oak----------- Willow oak---------- Sweetgum------------	82 80 80 80	230 --- --- 120	Water oak, sweetgum, loblolly pine, green ash, willow oak.
Besner-------	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ Sweetgum------------ Southern red oak----	91 82 --- ---	330 270 --- ---	Loblolly pine, sweetgum, southern red oak, white oak.
MsB----------- Moswell	15	Slight	Moderate	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak---- Sweetgum------------	85 76 --- ---	280 210 --- ---	Loblolly pine.
MsE----------- Moswell	15	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ Sweetgum------------ Southern red oak----	85 76 --- ---	280 210 --- ---	Loblolly pine.
MxA**:										
Moten--------	12	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine------- Shortleaf pine------ Water oak----------- Sweetgum------------	91 78 --- 90	330 270 --- 210	Loblolly pine, sweetgum, cherrybark oak, green ash.
Multey-------	18	Slight	Slight	Slight	Slight	Slight	Loblolly pine------- Sweetgum------------ Southern red oak----	90 90 ---	330 --- ---	Loblolly pine.
NaG----------- Naclina	29	Severe	Severe	Severe	Slight	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak----	65 50 ---	95 30 ---	Loblolly pine, shortleaf pine.
Nc------------ Naconiche	4	Slight	Severe	Severe	Severe	Severe	Willow oak---------- Water oak----------- Sweetgum------------ Green ash-----------	100 102 101 80	--- --- 310 ---	Water oak, willow oak, green ash, cherrybark oak.
Nh------------ Nahatche	3	Slight	Moderate	Moderate	Slight	Moderate	Water oak----------- Sweetgum------------ Green ash-----------	100 102 80	--- 310 ---	Water oak, willow oak, sweetgum, green ash, cherrybark oak.
Oz**:										
Ozias--------	3	Slight	Severe	Severe	Slight	Moderate	Sweetgum------------ Willow oak---------- Green ash----------- Overcup oak---------	104 102 85 ---	310 --- --- ---	Wllow oak, sweetgum, green ash.

See footnote at end of table.

Table 6.--Woodland Management and Productivity--Continued

Soil name and map symbol	Woodland management group***	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
Oz**:										
Pophers	3	Slight	Severe	Moderate	Slight	Moderate	Sweetgum	104	310	Water oak, green ash, sweetgum, cherrybark oak.
							Green ash	---	---	
							Water oak	102	---	
							Willow oak	102	---	
PeB Penning	12	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine	91	330	Loblolly pine, sweetgum, cherrybark oak, water oak.
							Shortleaf pine	81	270	
							Sweetgum	90	310	
							Water oak	---	---	
PnA Percilla	24	Slight	Moderate	Moderate	Severe	Moderate	Water oak	84	---	Water oak, willow oak, sweetgum, green ash.
							Willow oak	84	---	
							Sweetgum	82	120	
Po Pophers	3	Slight	Severe	Moderate	Slight	Moderate	Sweetgum	104	310	Water oak, green ash, sweetgum, cherrybark oak.
							Water oak	102	---	
							Green ash	---	---	
							Willow oak	102	---	
PsA Portersprings	13	Slight	Slight	Slight	Slight	Slight	Water oak	90	---	Water oak, green ash, pecan.
							Pecan	90	---	
							Green ash	80	265	
RnB Rentzel	12	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine	91	330	Loblolly pine, sweetgum, cherrybark oak, green ash.
							Shortleaf pine	82	270	
							Sweetgum	---	---	
							Water oak	---	---	
SaB Sacul	14	Slight	Moderate	Slight	Slight	Slight	Loblolly pine	85	280	Loblolly pine.
							Shortleaf pine	76	210	
							Sweetgum	---	---	
							Southern red oak	---	---	
SwA**:										
Sawlit	12	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine	91	330	Loblolly pine, sweetgum, cherrybark oak.
							Shortleaf pine	81	270	
							Sweetgum	90	210	
							Southern red oak	---	---	
Latex	10	Slight	Slight	Slight	Slight	Slight	Loblolly pine	91	330	Loblolly pine, sweetgum, southern red oak.
							Shortleaf pine	82	270	
							Sweetgum	90	210	
							Southern red oak	---	---	
TaE Tenaha	16	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine	85	280	Loblolly pine.
							Shortleaf pine	76	210	
							Southern red oak	---	---	
Te, Tf Texark	27	Slight	Severe	Moderate	Slight	Severe	Green ash	75	---	Willow oak, green ash, cottonwood, pecan.
							Willow oak	72	60	
							Hackberry	---	---	
							Pecan	---	---	
ToC Tonkawa	30	Slight	Severe	Severe	Slight	Severe	Loblolly pine	66	95	Loblolly pine, shortleaf pine.
							Shortleaf pine	57	60	

See footnote at end of table.

Table 6.--Woodland Management and Productivity--Continued

Soil name and map symbol	Woodland management group***	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to lant
TrE----------- Trawick	20	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	70	170	
							Southern red oak----	---	---	
TwC----------- Trawick	20	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	70	170	
							Southern red oak----	---	---	
TwE----------- Trawick	20	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	70	170	
							Southern red oak----	---	---	
TxG**:										
Trawick------	22	Severe	Moderate	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	70	170	
							Southern red oak----	---	---	
Bub----------	29	Severe	Severe	Moderate	Severe	Slight	Loblolly pine-------	67	95	Loblolly pine.
							Shortleaf pine------	57	60	
							Southern red oak----	---	---	
WnB----------- Woden	6	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	97	380	Loblolly pine, sweetgum, southern red oak, white ash.
							Shortleaf pine------	87	340	
							Sweetgum-----------	95	260	
							Southern red oak----	---	---	
WoB----------- Woodtell	21	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	81	230	Loblolly pine, sweetgum.
							Shortleaf pine------	72	170	
							White ash-----------	---	---	
							Southern red oak----	---	---	
WoE----------- Woodtell	21	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine, sweetgum, white ash.
							Shortleaf pine------	73	170	
							White ash-----------	---	---	
							Southern red oak----	---	---	

* Volume is the yield in board feet (Doyle Rule) per acre per year calculated at the age of 50 years for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

*** See Woodland Management and Productivity section for descriptions of woodland management groups.

Table 7.--Woodland Understory Vegetation

(Only the soils suitable for production of commercial trees are listed.)

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
AaB: Alazan	Favorable	1,800	Pinehill bluestem	50
	Normal	1,600	Longleaf uniola	10
	Unfavorable	1,500	Beaked panicum	10
			Purpletop	5
			Panicum	5
			Dogwood	5
			Southern bayberry	5
			Carolina jessamine	5
			American holly	5
AbA*:				
Alazan	Favorable	1,800	Pinehill bluestem	50
	Normal	1,600	Longleaf uniola	10
	Unfavorable	1,500	Beaked panicum	10
			Purpletop	5
			Panicum	5
			Dogwood	5
			Southern bayberry	5
			Carolina jessamine	5
			American holly	5
Besner.				
AfB: Alto	Favorable	3,500	Longleaf uniola	15
	Normal	2,000	Indiangrass	15
	Unfavorable	1,500	Sedge	15
			Pinehill bluestem	10
			Beaked panicum	10
			Panicum	10
			Brownseed paspalum	5
AnA*, AnB: Annona	Favorable	2,500	Little bluestem	15
	Normal	2,000	Brownseed paspalum	15
	Unfavorable	1,000	Panicum	15
			Indiangrass	10
			Longleaf uniola	10
			Purpletop	5
AtB: Attoyac	Favorable	1,300	Pinehill bluestem	55
	Normal	1,050	Slender bluestem	5
	Unfavorable	800	Longleaf uniola	5
			Splitbeard bluestem	5
			Southern bayberry	5
			Carolina jessamine	5
			Greenbrier	5
			Yaupon	5
			American beautyberry	5
AuB, AuD: Austonio	Favorable	1,300	Slender bluestem	5
	Normal	1,050	Longleaf uniola	5
	Unfavorable	800	Splitbeard bluestem	5
			Southern bayberry	5
			Carolina jessamine	5
			Yaupon	5
			American beautyberry	5

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
BaB----------------Bernaldo	Favorable	1,300	Pinehill bluestem	55
	Normal	1,050	Slender bluestem	5
	Unfavorable	800	Longleaf uniola	5
			Splitbeard bluestem	5
			Southern bayberry	5
			Carolina jessamine	5
			Yaupon	5
			American beautyberry	5
BbA*:				
Bernaldo----------	Favorable	1,300	Pinehill bluestem	55
	Normal	1,050	Slender bluestem	5
	Unfavorable	800	Longleaf uniola	5
			Splitbeard bluestem	5
			Southern bayberry	5
			Carolina jessamine	5
			Yaupon	5
			American beautyberry	5
Besner.				
BtC----------------Betis	Favorable	3,000	Mountain muhly	15
	Normal	2,000	Arrowfeather threeawn	15
	Unfavorable	1,200	Longleaf uniola	15
			Broomsedge bluestem	10
			Beaked panicum	5
			Purpletop	5
			Indiangrass	5
BwB----------------Bowie	Favorable	3,500	Pinehill bluestem	50
	Normal	3,000	Pineywoods dropseed	10
	Unfavorable	2,000	Longleaf uniola	10
			Big bluestem	10
			Indiangrass	5
ChA----------------Chireno	Favorable	3,500	Longleaf uniola	20
	Normal	2,500	Sedge	10
	Unfavorable	2,000	Purpletop	10
			Indiangrass	5
			Little bluestem	5
			Panicum	5
			Lespedeza	5
			Tickclover	5
			Plains lovegrass	5
			Mississippi dropseed	5
			Meadow dropseed	5
CtE----------------Cuthbert	Favorable	2,300	Pinehill bluestem	50
	Normal	1,800	Big bluestem	10
	Unfavorable	1,300	Longleaf uniola	10
			Fineleaf bluestem	5
			Pineywoods dropseed	5
			Cutover muhly	5
CtG----------------Cuthbert	Favorable	2,200	Pinehill bluestem	50
	Normal	1,700	Longleaf uniola	10
	Unfavorable	1,200	Fineleaf bluestem	10
			Big bluestem	5
			Pineywoods dropseed	5

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
CuE-----------------Cuthbert	Favorable	2,300	Pinehill bluestem	50
	Normal	1,800	Big bluestem	10
	Unfavorable	1,300	Longleaf uniola	10
			Fineleaf bluestem	5
			Pineywoods dropseed	5
			Cutover muhly	5
DaC, DaE-----------Darco	Favorable	1,650	Pinehill bluestem	50
	Normal	1,350	Longleaf uniola	10
	Unfavorable	1,000	Indiangrass	5
			Fineleaf bluestem	5
			Splitbeard bluestem	5
			Pineywoods dropseed	5
			Purple lovegrass	5
			Fringeleaf paspalum	5
EaA, EaB-----------Eastham	Favorable	6,000	Little bluestem	40
	Normal	5,000	Indiangrass	15
	Unfavorable	3,500	Big bluestem	15
			Texas wintergrass	10
			Silver bluestem	5
			Tall dropseed	5
ErB-----------------Elrose	Favorable	1,500	Longleaf uniola	10
	Normal	1,200	Pineywoods dropseed	10
	Unfavorable	900	Big bluestem	10
			Pinehill bluestem	10
EtB-----------------Etoile	Favorable	3,500	Longleaf uniola	20
	Normal	2,100	Pinehill bluestem	10
	Unfavorable	1,500	Panicum	10
			Beaked panicum	5
			Purpletop	5
			Sedge	5
			Gayfeather	5
FrB-----------------Freestone	Favorable	2,500	Little bluestem	15
	Normal	1,750	Beaked panicum	15
	Unfavorable	1,000	Longleaf uniola	15
			Purpletop	10
			Panicum	10
FsA*:				
Freestone----------	Favorable	2,500	Little bluestem	15
	Normal	1,750	Beaked panicum	15
	Unfavorable	1,000	Longleaf uniola	15
			Purpletop	10
			Panicum	10
Derly---------------	Favorable	4,500	Florida paspalum	15
	Normal	3,500	Virginia wildrye	15
	Unfavorable	2,000	Little bluestem	10
			Beaked panicum	10
			Giant cane	10
			Panicum	10
			Redtop panicum	10
			Carolina jointtail	5

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
FuA, FuB----------- Fuller	Favorable	1,900	Pinehill bluestem	35
	Normal	1,700	Longleaf uniola	10
	Unfavorable	1,550	Sedge	5
			Broomsedge bluestem	5
			Thoroughwort	5
			Beaked panicum	5
			Threeawn	5
			Switchgrass	5
			Blackgum	5
			Hawthorn	5
			Red maple	5
GaA---------------- Garner	Favorable	4,500	Pinehill bluestem	15
	Normal	3,500	Longleaf uniola	15
	Unfavorable	2,000	Little bluestem	15
			Virginia wildrye	5
			Indiangrass	5
			Eastern gamagrass	5
			Florida paspalum	5
GrB---------------- Grapeland	Favorable	1,200	Pinehill bluestem	25
	Normal	1,000	Longleaf uniola	15
	Unfavorable	600	Broomsedge bluestem	10
			Beaked panicum	5
			Arrowfeather threeawn	5
			Purpletop	5
			Indiangrass	5
HaA---------------- Hainesville	Favorable	1,200	Longleaf uniola	10
	Normal	1,000	Purpletop	5
	Unfavorable	600	Indiangrass	5
			Greenbrier	5
HbC---------------- Hallsbluff	Favorable	5,500	Little bluestem	40
	Normal	4,500	Indiangrass	10
	Unfavorable	3,000	Big bluestem	10
			Silver bluestem	10
			Tall dropseed	10
			Texas wintergrass	5
Hc----------------- Hannahatchee	Favorable	1,800	Beaked panicum	15
	Normal	1,600	Virginia wildrye	15
	Unfavorable	1,200	Longleaf uniola	10
			Sedge	10
			Switchgrass	10
HeA, HeB----------- Herty	Favorable	2,000	Pinehill bluestem	50
	Normal	1,800	Fineleaf bluestem	10
	Unfavorable	1,600	Big bluestem	5
			Indiangrass	5
			Panicum	5
			Common carpetgrass	5
			Grassleaf goldaster	5
			St andrews cross	5
			American beautyberry	5
Iu----------------- Iulus	Favorable	1,800	Pinehill bluestem	50
	Normal	1,500	Beaked panicum	10
	Unfavorable	1,200	Spreading panicum	10
			Brownseed paspalum	10
			Longleaf uniola	10

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
Ka, Kb------------- Kaufman	Favorable	6,000	Virginia wildrye	20
	Normal	3,500	Sedge	20
	Unfavorable	1,500	Rustyseed paspalum	10
			Longleaf uniola	10
			Beaked panicum	5
			Switchgrass	5
			Eastern gamagrass	5
			Panicum	5
			Hawthorn	5
			Yaupon	5
KcE---------------- Kellison	Favorable	1,900	Pinehill bluestem	50
	Normal	1,800	Fineleaf bluestem	10
	Unfavorable	1,500	Big bluestem	10
			Sedge	5
			Hawthorn	5
			American beautyberry	5
			Panicum	5
			Longleaf uniola	5
			St andrews cross	5
KeB, KeD----------- Keltys	Favorable	1,500	Pinehill bluestem	50
	Normal	1,200	Greenbrier	5
	Unfavorable	1,000	Carolina jessamine	5
			Blackberry	5
			American beautyberry	5
			Sassafras	5
			Big bluestem	5
			Pineywoods dropseed	5
			Tall dropseed	5
KfC---------------- Kirvin	Favorable	2,000	Pinehill bluestem	50
	Normal	1,300	Longleaf uniola	10
	Unfavorable	1,000	Pineywoods dropseed	5
			American beautyberry	5
			Purpletop	5
			Indiangrass	5
			Brownseed paspalum	5
KgC---------------- Kirvin	Favorable	2,400	Pinehill bluestem	50
	Normal	1,900	Longleaf uniola	10
	Unfavorable	1,500	American beautyberry	5
			Indiangrass	5
			Brownseed paspalum	5
			Fineleaf bluestem	5
KhC---------------- Kirvin	Favorable	2,300	Pinehill bluestem	50
	Normal	1,800	Fineleaf bluestem	10
	Unfavorable	1,200	Longleaf uniola	10
			Big bluestem	10
			Splitbeard bluestem	5
Ko----------------- Kosse	Favorable	5,500	Virginia wildrye	20
	Normal	3,500	Rustyseed paspalum	15
	Unfavorable	3,000	Beaked panicum	10
			Sedge	10
			Bentawn plumegrass	5
			Giant cane	5

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
Kp: Koury	Favorable	1,700	Pinehill bluestem	35
	Normal	1,500	Yaupon	10
	Unfavorable	1,200	Southern bayberry	10
			Alabama supplejack	5
			Poison ivy	5
			Muscadine grape	5
			Red maple	5
			Hawthorn	5
			Longleaf uniola	5
			Brackenfern	5
			Thoroughwort	5
			Broomsedge bluestem	5
			Common carpetgrass	5
			Beaked panicum	5
KuB, KuD: Kurth	Favorable	1,500	Pinehill bluestem	50
	Normal	1,200	Greenbrier	5
	Unfavorable	1,000	Carolina jessamine	5
			Blackberry	5
			American beautyberry	5
			Sassafras	5
			Big bluestem	5
			Pineywoods dropseed	5
			Tall dropseed	5
LaA, LaB, LaE: LaCerda	Favorable	3,500	Longleaf uniola	20
	Normal	2,100	Pinehill bluestem	10
	Unfavorable	1,500	Panicum	10
			Beaked panicum	5
			Purpletop	5
			Sedge	5
			Gayfeather	5
Lc: Laneville	Favorable	---		
	Normal	---		
	Unfavorable	---		
LeB: Latex	Favorable	3,000	Pinehill bluestem	20
	Normal	2,500	Longleaf uniola	15
	Unfavorable	1,800	Beaked panicum	10
			Pineywoods dropseed	5
			Fringeleaf paspalum	5
			Winged elm	5
			Sedge	5
LtC: Lilbert	Favorable	1,500	Pinehill bluestem	50
	Normal	1,200	Fineleaf bluestem	10
	Unfavorable	900	Longleaf uniola	10
			Pineywoods dropseed	10
			Indiangrass	5
LvC, LvD: Lovelady	Favorable	1,500	Pinehill bluestem	50
	Normal	1,200	Greenbrier	5
	Unfavorable	1,000	Carolina jessamine	5
			Blackberry	5
			American beautyberry	5
			Sassafras	5
			Big bluestem	5
			Pineywoods dropseed	5
			Tall dropseed	5

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
MoA----------------Mollville	Favorable	2,000	Pinehill bluestem-------------------------	35
	Normal	1,750	Switchgrass-------------------------------	10
	Unfavorable	1,400	Longleaf uniola---------------------------	10
			Cutover muhly-----------------------------	10
			Switchcane--------------------------------	5
			Beaked panicum----------------------------	5
			Blackgum----------------------------------	5
			Spreading panicum-------------------------	5
MpA*:				
Mollville---------	Favorable	2,000	Pinehill bluestem-------------------------	35
	Normal	1,750	Switchgrass-------------------------------	10
	Unfavorable	1,400	Longleaf uniola---------------------------	10
			Cutover muhly-----------------------------	10
			Switchcane--------------------------------	5
			Beaked panicum----------------------------	5
			Blackgum----------------------------------	5
			Spreading panicum-------------------------	5
Besner.				
MsB, MsE-----------Moswell	Favorable	1,900	Pinehill bluestem-------------------------	50
	Normal	1,800	Panicum-----------------------------------	5
	Unfavorable	1,500	Slender bluestem--------------------------	5
			Pineywoods dropseed-----------------------	5
			Florida paspalum--------------------------	5
			Switchgrass-------------------------------	5
			Longleaf uniola---------------------------	5
			Hawthorn----------------------------------	5
			American beautyberry----------------------	5
			Greenbrier--------------------------------	5
MxA*:				
Moten-------------	Favorable	4,000	Virginia wildrye--------------------------	15
	Normal	3,000	Pinehill bluestem-------------------------	10
	Unfavorable	2,000	Beaked panicum----------------------------	10
			Silver plumegrass-------------------------	10
			Longleaf uniola---------------------------	10
			Sedge-------------------------------------	10
			Florida paspalum--------------------------	5
Multey------------	Favorable	1,800	Pinehill bluestem-------------------------	40
	Normal	1,200	Tickclover--------------------------------	5
	Unfavorable	975	Big bluestem------------------------------	5
			Indiangrass-------------------------------	5
			Brownseed paspalum------------------------	5
			Switchgrass-------------------------------	5
			Longleaf uniola---------------------------	5
			American beautyberry----------------------	5
			Dogwood-----------------------------------	5
			Sassafras---------------------------------	5
			Muscadine grape---------------------------	5
NaG----------------Naclina	Favorable	5,000	Hawthorn----------------------------------	25
	Normal	3,800	Pinehill bluestem-------------------------	10
	Unfavorable	2,500	Longleaf uniola---------------------------	10
			Panicum-----------------------------------	10
			Beaked panicum----------------------------	10
			Purpletop---------------------------------	5

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
Nc-----------------Naconiche	Favorable	1,000	Cinnamon fern	25
	Normal	800	Sedge	10
	Unfavorable	600	Hazel alder	10
			Huckleberry	10
			Red maple	5
			Redbay	5
			Sweetbay	5
			Water oak	5
			Willow oak	5
Nh-----------------Nahatche	Favorable	3,000	Virginia wildrye	15
	Normal	2,000	Beaked panicum	15
	Unfavorable	1,500	Longleaf uniola	15
			Sedge	10
			Eastern gamagrass	5
			Switchgrass	5
			Purpletop	5
			Indiangrass	5
			Knotroot bristlegrass	5
			Brownseed paspalum	5
Oz*:				
Ozias	Favorable	1,400	Saw palmetto	20
	Normal	1,200	Maidencane	10
	Unfavorable	1,100	Switchgrass	10
			Hawthorn	10
			Smartweed	5
			St andrews cross	5
			Bushy bluestem	5
			Common carpetgrass	5
			Beaked panicum	5
			Alabama supplejack	5
			Buttonbush	5
			Elm	5
			Panicum	5
Pophers	Favorable	1,400	Pinehill bluestem	30
	Normal	1,200	Sedge	10
	Unfavorable	1,000	Saw palmetto	10
			Greenbrier	10
			Bushy bluestem	5
			Switchcane	5
			Beaked panicum	5
			Panicum	5
			Switchgrass	5
			Hawthorn	5
			Southern bayberry	5
PeB----------------Penning	Favorable	1,800	Pinehill bluestem	35
	Normal	1,600	Longleaf uniola	10
	Unfavorable	1,400	Broomsedge bluestem	5
			Beaked panicum	5
			Switchgrass	5
			Blackgum	5
			Hawthorn	5
			Dogwood	5
			Southern bayberry	5
			Thoroughwort	5
			Indiangrass	5

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
PnA----------------	Favorable	2,000	Sedge	25
Percilla	Normal	1,500	Rustyseed paspalum	15
	Unfavorable	1,000	Virginia wildrye	15
			Beaked panicum	10
			Paspalum	5
			Panicum	5
			Nimblewill muhly	5
			Lespedeza	5
			Longleaf uniola	5
Po-----------------	Favorable	1,400	Pinehill bluestem	30
Pophers	Normal	1,200	Sedge	10
	Unfavorable	1,000	Saw palmetto	10
			Greenbrier	10
			Bushy bluestem	5
			Switchcane	5
			Beaked panicum	5
			Panicum	5
			Switchgrass	5
			Hawthorn	5
			Southern bayberry	5
PsA----------------	Favorable	2,500	Longleaf uniola	20
Portersprings	Normal	1,600	Switchgrass	15
	Unfavorable	1,000	Virginia wildrye	15
			Indiangrass	10
			Pinehill bluestem	10
			Purpletop	10
			Eastern gamagrass	10
			American beautyberry	5
			Greenbrier	5
RnB----------------	Favorable	1,800	Pinehill bluestem	50
Rentzel	Normal	1,400	Longleaf uniola	10
	Unfavorable	1,000	Beaked panicum	10
			Purpletop	5
SwA*:				
Sawlit------------	Favorable	1,800	Pinehill bluestem	50
	Normal	1,600	Longleaf uniola	10
	Unfavorable	1,200	Beaked panicum	10
			Purpletop	10
Latex-------------	Favorable	3,000	Pinehill bluestem	20
	Normal	2,500	Longleaf uniola	15
	Unfavorable	1,800	Beaked panicum	10
			Pineywoods dropseed	5
			Fringeleaf paspalum	5
			Winged elm	5
			Sedge	5
TaE----------------	Favorable	2,500	Pinehill bluestem	50
Tenaha	Normal	2,000	Fineleaf bluestem	10
	Unfavorable	1,250	Longleaf uniola	10
			Indiangrass	5
			Slender bluestem	5
			Pineywoods dropseed	5
			Dogwood	5
			Yaupon	5

See footnote at end of table.

Table 7.--Woodland Understory Vegetation--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
Te, Tf: Texark	Favorable	4,000	Sedge	20
	Normal	2,500	Virginia wildrye	15
	Unfavorable	1,200	Paspalum	10
			Panicum	10
			Beaked panicum	5
			Purpletop	5
			Switchcane	5
			Hawthorn	5
ToC: Tonkawa	Favorable	2,000	Broomsedge bluestem	20
	Normal	1,200	Pinehill bluestem	20
	Unfavorable	800	Arrowfeather threeawn	15
			Panicum	10
			Indiangrass	10
TrE, TwC, TwE: Trawick	Favorable	3,200	Longleaf uniola	20
	Normal	2,000	Indiangrass	15
	Unfavorable	1,200	Panicum	10
			Pinehill bluestem	10
			Sedge	10
TxG*:				
Trawick	Favorable	3,200	Longleaf uniola	20
	Normal	2,000	Indiangrass	15
	Unfavorable	1,200	Panicum	10
			Pinehill bluestem	10
			Sedge	10
Bub	Favorable	2,500	Longleaf uniola	20
	Normal	1,500	Indiangrass	15
	Unfavorable	1,000	Panicum	10
			Pinehill bluestem	10
			Sedge	10
WnB: Woden	Favorable	3,000	Pinehill bluestem	15
	Normal	2,000	Beaked panicum	15
	Unfavorable	1,500	Panicum	15
			Longleaf uniola	10
			Brownseed paspalum	10
			Indiangrass	5
			Purpletop	5
WoB, WoE: Woodtell	Favorable	2,500	Pinehill bluestem	20
	Normal	2,000	Panicum	10
	Unfavorable	1,500	Sedge	10
			Brownseed paspalum	10
			Indiangrass	5
			Longleaf uniola	5
			Purpletop	5
			Carolina jointtail	5
			Knotroot bristlegrass	5
			Splitbeard bluestem	5

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated.)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AaB: Alazan	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
AbA*:				
Alazan	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Besner	Slight	Slight	Slight	Slight.
AfB: Alto	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
AnA*, AnB: Annona	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
AtB: Attoyac	Slight	Slight	Moderate: slope.	Slight.
AuB: Austonio	Slight	Slight	Moderate: slope.	Slight.
AuD: Austonio	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
BaB: Bernaldo	Slight	Slight	Moderate: slope.	Slight.
BbA*:				
Bernaldo	Slight	Slight	Slight	Slight.
Besner	Slight	Slight	Slight	Slight.
BeA: Besner	Slight	Slight	Slight	Slight.
BtC: Betis	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
BwB: Bowie	Slight	Slight	Moderate: slope.	Slight.
ChA: Chireno	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight.
CtE: Cuthbert	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.
CtG: Cuthbert	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
CuE: Cuthbert	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope, small stones.	Slight.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
DaC: Darco	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
DaE: Darco	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
EaA, EaB: Eastham	Severe: percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey.
ErB: Elrose	Slight	Slight	Moderate: slope, small stones.	Slight.
EtB: Etoile	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
FrB: Freestone	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight.
FsA*:				
Freestone	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight.
Derly	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
FuA, FuB: Fuller	Severe: wetness, percs slowly, excess sodium.	Severe: wetness, excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: wetness.
GaA: Garner	Severe: percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey.
GrB: Grapeland	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
HaA: Hainesville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
HbC: Hallsbluff	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
Hc: Hannahatchee	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
HeA, HeB: Herty	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.
Iu: Iulus	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Ka------------------- Kaufman	Severe: flooding, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey.
Kb------------------- Kaufman	Severe: flooding, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, flooding, percs slowly.	Severe: too clayey.
KcE------------------ Kellison	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.
KeB------------------ Keltys	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
KeD------------------ Keltys	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
KfC------------------ Kirvin	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
KgC------------------ Kirvin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
KhC------------------ Kirvin	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Ko------------------- Kosse	Severe: flooding.	Moderate: percs slowly.	Moderate: flooding, percs slowly.	Slight.
Kp------------------- Koury	Severe: flooding.	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.
KuB------------------ Kurth	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
KuD------------------ Kurth	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
LaA, LaB------------- LaCerda	Severe: percs slowly, too clayey.	Severe: percs slowly, too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
LaE------------------ LaCerda	Severe: percs slowly, too clayey.	Severe: percs slowly, too clayey.	Severe: percs slowly, too clayey, slope.	Severe: too clayey.
Lc------------------- Laneville	Severe: flooding.	Moderate: flooding, wetness, percs slowly.	Severe: flooding.	Moderate: wetness, flooding.
LeB------------------ Latex	Slight--------------	Slight--------------	Moderate: slope.	Slight.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
LtC: Lilbert	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
LvC: Lovelady	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: slope, too sandy, wetness.	Moderate: too sandy.
LvD: Lovelady	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Severe: slope.	Moderate: too sandy.
MoA: Mollville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MpA*:				
Mollville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Besner	Slight	Slight	Slight	Slight.
MsB: Moswell	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
MsE: Moswell	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.
MxA*:				
Moten	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight.
Multey	Slight	Slight	Slight	Slight.
NaG: Naclina	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope.
Nc: Naconiche	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
Nh: Nahatche	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
Oz*:				
Ozias	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, flooding.	Severe: wetness.
Pophers	Severe: flooding, wetness.	Moderate: wetness, flooding.	Severe: wetness, flooding.	Moderate: wetness, flooding.
PeB: Penning	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
PnA: Percilla	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
Po: Pophers	Severe: flooding, wetness.	Slight	Slight	Slight.
PsA: Portersprings	Severe: flooding.	Slight	Slight	Slight.
RnB: Rentzel	Moderate: wetness, percs slowly, too sandy.	Moderate: wetness, percs slowly, too sandy.	Moderate: slope, wetness, too sandy, percs slowly.	Moderate: wetness, too sandy.
SaB: Sacul	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Slight.
SwA*:				
Sawlit	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
Latex	Slight	Slight	Slight	Slight.
TaE: Tenaha	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
Te: Texark	Severe: flooding, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey.
Tf: Texark	Severe: flooding, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, flooding, percs slowly.	Severe: too clayey.
ToC: Tonkawa	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, slope.	Severe: too sandy.
TrE: Trawick	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.
TwC: Trawick	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight.
TwE: Trawick	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: slope, small stones.	Slight.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
TxG*:				
Trawick	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Bub	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
WnB Woden	Slight	Slight	Moderate: slope.	Slight.
WoB Woodtell	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
WoE Woodtell	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 9.--Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated.)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AaB: Alazan	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
AbA*:										
Alazan	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Besner	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AfB: Alto	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AnA*: Annona	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
AnB: Annona	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AtB: Attoyac	Good	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
AuB: Austonio	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AuD: Austonio	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BaB: Bernaldo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BbA*:										
Bernaldo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Besner	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BeA: Besner	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BtC: Betis	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BwB: Bowie	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ChA: Chireno	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
CtE: Cuthbert	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CtG: Cuthbert	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Potential as habitat for: Openland wildlife	Woodland wildlife	Wetland wildlife
CuE---------------- Cuthbert	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DaC---------------- Darco	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
DaE---------------- Darco	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EaA, EaB----------- Eastham	Fair	Fair	Fair	Fair	---	Poor	Poor	Fair	Fair	Poor.
ErB---------------- Elrose	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
EtB---------------- Etoile	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
FrB---------------- Freestone	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FsA*:										
Freestone----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Derly--------------	Fair	Fair	Good	Fair	Fair	Good	Good	Fair	Fair	Good.
FuA, FuB----------- Fuller	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
GaA---------------- Garner	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Poor.
GrB---------------- Grapeland	Fair	Fair	Good	Poor	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.
HaA---------------- Hainesville	Fair	Fair	Good	Poor	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.
HbC---------------- Hallsbluff	Fair	Fair	Fair	Fair	---	Poor	Very poor.	Fair	Fair	Poor.
Hc----------------- Hannahatchee	Poor	Good	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
HeA, HeB----------- Herty	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Iu----------------- Iulus	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Ka----------------- Kaufman	Fair	Fair	Poor	Good	---	Poor	Good	Fair	Good	Fair.
Kb----------------- Kaufman	Poor	Poor	Fair	Good	---	Poor	Good	Poor	Good	Fair.
KcE---------------- Kellison	Fair	Fair	Fair	Good	Fair	Poor	Poor	Fair	Good	Poor.

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for: Openland wildlife	Woodland wildlife	Wetland wildlife
KeB: Keltys	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
KeD: Keltys	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KfC: Kirvin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KgC: Kirvin	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KhC: Kirvin	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Ko: Kosse	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair	Fair.
Kp: Koury	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair	Good	Fair.
KuB: Kurth	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
KuD: Kurth	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LaA, LaB: LaCerda	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LaE: LaCerda	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Lc: Laneville	Poor	Fair	Fair	Good	---	Fair	Poor	Poor	Good	Poor.
LeB: Latex	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LtC: Lilbert	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
LvC, LvD: Lovelady	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
MoA: Mollville	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
MpA*:										
Mollville	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Besner	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MsB: Moswell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MsE: Moswell	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Potential as habitat for-: Openland wildlife	Woodland wildlife	Wetland wildlife
MxA*:										
Moten	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good.
Multey	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
NaG Naclina	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Nc Naconiche	Very poor.	Poor	Poor	Poor	Poor	Fair	Good	Poor	Fair	Fair.
Nh Nahatche	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair	Good	Poor.
Oz*:										
Ozias	Poor	Fair	Fair	Fair	Very poor.	Fair	Good	Fair	Fair	Good.
Pophers	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair	Good	Fair.
PeB Penning	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Fair.
PnA Percilla	Poor	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good.
Po Pophers	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair	Good	Fair.
PsA Portersprings	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
RnB Rentzel	Poor	Fair	Good	Good	Good	Fair	Poor	Fair	Good	Poor.
SaB Sacul	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
SwA*:										
Sawlit	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Latex	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TaE Tenaha	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Te, Tf Texark	Poor	Fair	Fair	Good	---	Good	Fair	Fair	Good	Fair.
ToC Tonkawa	Poor	Poor	Fair	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
TrE Trawick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TwC Trawick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for-- Openland wildlife	Woodland wildlife	Wetland wildlife
TwE----------------Trawick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TxG*:										
Trawick-----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Bub---------------	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
WnB----------------Woden	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WoB----------------Woodtell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
WoE----------------Woodtell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaB: Alazan	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
AbA*:						
Alazan	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
Besner	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
AfB: Alto	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
AnA*, AnB: Annona	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
AtB: Attoyac	Slight	Slight	Slight	Slight	Moderate: low strength.	Slight.
AuB: Austonio	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
AuD: Austonio	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
BaB: Bernaldo	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
BbA*:						
Bernaldo	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Besner	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
BeA: Besner	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
BtC: Betis	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
BwB: Bowie	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
ChA: Chireno	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CtE: Cuthbert	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: droughty.
CtG: Cuthbert	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Moderate: droughty.
CuE: Cuthbert	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, droughty.
DaC: Darco	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
DaE: Darco	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
EaA, EaB: Eastham	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
ErB: Elrose	Moderate: too clayey.	Slight	Slight	Slight	Severe: low strength.	Slight.
EtB: Etoile	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
FrB: Freestone	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
FsA*:						
Freestone	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
Derly	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
FuA, FuB: Fuller	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: excess sodium, wetness.
GaA: Garner	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
GrB: Grapeland	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
HaA: Hainesville	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
HbC: Hallsbluff	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Hc: Hannahatchee	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
HeA, HeB: Herty	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
Iu: Iulus	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Ka: Kaufman	Severe: cutbanks cave, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: too clayey.
Kb: Kaufman	Severe: cutbanks cave, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: flooding, too clayey.
KcE: Kellison	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
KeB: Keltys	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
KeD: Keltys	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
KfC: Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
KgC: Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Severe: small stones.
KhC: Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Ko: Kosse	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Kp: Koury	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, low strength.	Severe: flooding.
KuB: Kurth	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
KuD: Kurth	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Slight.
LaA, LaB: LaCerda	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LaE: LaCerda	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: too clayey.
Lc: Laneville	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness, shrink-swell.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
LeB: Latex	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
LtC: Lilbert	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
LvC, LvD: Lovelady	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
MoA: Mollville	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MpA*:						
Mollville	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Besner	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
MsB: Moswell	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
MsE: Moswell	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
MxA*:						
Moten	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
Multey	Slight	Slight	Slight	Slight	Slight	Slight.
NaG: Naclina	Severe: cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Nc: Naconiche	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Nh: Nahatche	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Oz*:						
Ozias	Severe: cutbanks cave, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, flooding.
Pophers	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: flooding.
PeB: Penning	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
PnA: Percilla	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
Po: Pophers	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: flooding.
PsA: Portersprings	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
RnB: Rentzel	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, too sandy.
SaB: Sacul	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
SwA*:						
Sawlit	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
Latex	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
TaE: Tenaha	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Te: Texark	Severe: cutbanks cave, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: too clayey.
Tf: Texark	Severe: cutbanks cave, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, low strength, wetness.	Severe: flooding, too clayey.
ToC: Tonkawa	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TrE: Trawick	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
TwC: Trawick	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Moderate: small stones.
TwE: Trawick	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
TxG*:						
Trawick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Bub	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, depth to rock.
WnB: Woden	Slight	Slight	Slight	Slight	Slight	Slight.
WoB: Woodtell	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
WoE: Woodtell	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaB: Alazan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
AbA*:					
Alazan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Besner	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
AfB: Alto	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
AnA*: Annona	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
AnB: Annona	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
AtB: Attoyac	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
AuB: Austonio	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Good.
AuD: Austonio	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
BaB: Bernaldo	Moderate: wetness, percs slowly.	Severe: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
BbA*:					
Bernaldo	Moderate: wetness, percs slowly.	Severe: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Besner	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
BeA: Besner	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
BtC: Betis	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BwB----------------- Bowie	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness, too clayey.	Slight-----------	Fair: too clayey.
ChA----------------- Chireno	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
CtE----------------- Cuthbert	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
CtG----------------- Cuthbert	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
CuE----------------- Cuthbert	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
DaC----------------- Darco	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: too sandy.
DaE----------------- Darco	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: too sandy.
EaA----------------- Eastham	Severe: percs slowly.	Slight-----------	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
EaB----------------- Eastham	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
ErB----------------- Elrose	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Poor: too clayey.
EtB----------------- Etoile	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
FrB----------------- Freestone	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
FsA*:					
Freestone----------	Severe: wetness, percs slowly.	Slight-----------	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Derly--------------	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
FuA----------------- Fuller	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
FuB----------------- Fuller	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GaA: Garner	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
GrB: Grapeland	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
HaA: Hainesville	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
HbC: Hallsbluff	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Hc: Hannahatchee	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
HeA: Herty	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
HeB: Herty	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Iu: Iulus	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Fair: wetness.
Ka, Kb: Kaufman	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack.
KcE: Kellison	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
KeB, KeD: Keltys	Severe: percs slowly.	Moderate: seepage, slope, depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock.
KfC, KgC, KhC: Kirvin	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Ko: Kosse	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: too clayey.
Kp: Koury	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
KuB, KuD------------ Kurth	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: too acid.	Slight-----------	Poor: too acid.
LaA----------------- LaCerda	Severe: percs slowly.	Slight-----------	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
LaB----------------- LaCerda	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
LaE----------------- LaCerda	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Lc------------------ Laneville	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
LeB----------------- Latex	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness, too clayey.	Slight-----------	Fair: too clayey, wetness, thin layer.
LtC----------------- Lilbert	Severe: percs slowly.	Severe: seepage.	Slight-----------	Severe: seepage.	Good.
LvC, LvD------------ Lovelady	Severe: percs slowly, poor filter.	Severe: seepage.	Moderate: too clayey.	Severe: seepage.	Good.
MoA----------------- Mollville	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
MpA*:					
Mollville----------	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
Besner-------------	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
MsB----------------- Moswell	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
MsE----------------- Moswell	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
MxA*:					
Moten--------------	Severe: wetness, percs slowly.	Moderate: seepage.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
Multey-------------	Moderate: percs slowly.	Moderate: seepage.	Severe: seepage.	Slight-----------	Good.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
NaG: Naclina	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Nc: Naconiche	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Nh: Nahatche	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Oz*:					
Ozias	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Pophers	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
PeB: Penning	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness, thin layer.
PnA: Percilla	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Po: Pophers	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
PsA: Portersprings	Moderate: flooding, percs slowly.	Moderate: seepage.	Severe: seepage.	Moderate: flooding.	Good.
RnB: Rentzel	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage.	Fair: wetness.
SaB: Sacul	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
SwA*:					
Sawlit	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Latex	Severe: wetness, percs slowly.	Moderate: seepage.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness, thin layer.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TaE----------------- Tenaha	Severe: percs slowly, poor filter.	Severe: seepage, slope.	Moderate: slope, too sandy.	Severe: seepage.	Fair: too sandy, slope, thin layer.
Te------------------ Texark	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack.
Tf------------------ Texark	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack.
ToC----------------- Tonkawa	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TrE----------------- Trawick	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
TwC----------------- Trawick	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
TwE----------------- Trawick	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
TxG*:					
Trawick------------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Bub----------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
WnB----------------- Woden	Slight-----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
WoB----------------- Woodtell	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
WoE----------------- Woodtell	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AaB: Alazan	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
AbA*:				
Alazan	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Besner	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
AfB: Alto	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
AnA*, AnB: Annona	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
AtB: Attoyac	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
AuB: Austonio	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
AuD: Austonio	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
BaB: Bernaldo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
BbA*:				
Bernaldo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Besner	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
BeA: Besner	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
BtC: Betis	Good	Probable	Improbable: too sandy.	Poor: too sandy.
BwB: Bowie	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
ChA: Chireno	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CtE: Cuthbert	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CtG: Cuthbert	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
CuE: Cuthbert	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
DaC, DaE: Darco	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too sandy.
EaA, EaB: Eastham	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ErB: Elrose	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
EtB: Etoile	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FrB: Freestone	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
FsA*:				
Freestone	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Derly	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
FuA, FuB: Fuller	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
GaA: Garner	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GrB: Grapeland	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
HaA: Hainesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
HbC: Hallsbluff	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Hc: Hannahatchee	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HeA, HeB: Herty	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Iu: Iulus	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ka, Kb: Kaufman	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
KcE: Kellison	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
KeB, KeD: Keltys	Fair: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Good.
KfC, KgC, KhC: Kirvin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Ko: Kosse	Good.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Kp: Koury	Good.	Improbable: excess fines.	Improbable: excess fines.	Good.
KuB, KuD: Kurth	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
LaA, LaB, LaE: LaCerda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Lc: Laneville	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
LeB: Latex	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
LtC: Lilbert	Good.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
LvC, LvD: Lovelady	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
MoA: Mollville	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MpA*:				
Mollville	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Besner	Good.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MsB, MsE: Moswell	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MxA*:				
Moten	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Multey	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
NaG: Naclina	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Nc: Naconiche	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Nh: Nahatche	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Oz*:				
Ozias	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
Pophers	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
PeB: Penning	Fair: low strength, thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
PnA: Percilla	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Po: Pophers	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
PsA: Portersprings	Good	Improbable: excess fines.	Improbable: too sandy.	Fair: too clayey.
RnB: Rentzel	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
SaB: Sacul	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
SwA*:				
Sawlit	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SwA*:				
Latex	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
TaE Tenaha	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
Te, Tf Texark	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ToC Tonkawa	Good	Probable	Improbable: too sandy.	Poor: too sandy.
TrE Trawick	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
TwC, TwE Trawick	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
TxG*:				
Trawick	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
Bub	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
WnB Woden	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
WoB, WoE Woodtell	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
AaB: Alazan	Moderate: seepage.	Severe: wetness.	Favorable	Wetness, soil blowing, erodes easily.	Erodes easily, wetness, soil blowing.	Erodes easily.
AbA*:						
Alazan	Moderate: seepage.	Severe: wetness.	Favorable	Wetness, soil blowing, erodes easily.	Erodes easily, wetness, soil blowing.	Erodes easily.
Besner	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
AfB: Alto	Moderate: seepage.	Moderate: wetness.	Favorable	Wetness	Wetness	Favorable.
AnA*, AnB: Annona	Slight	Severe: hard to pack.	Deep to water	Percs slowly	Percs slowly, erodes easily.	Erodes easily, percs slowly.
AtB: Attoyac	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
AuB: Austonio	Moderate: seepage.	Severe: thin layer.	Deep to water	Soil blowing	Soil blowing	Favorable.
AuD: Austonio	Moderate: seepage.	Severe: thin layer.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
BaB: Bernaldo	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
BbA*:						
Bernaldo	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
Besner	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
BeA: Besner	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
BtC: Betis	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
BwB: Bowie	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
ChA: Chireno	Slight	Moderate: hard to pack, wetness.	Deep to water	Favorable	Favorable	Favorable.
CtE, CtG: Cuthbert	Moderate: seepage.	Moderate: piping.	Deep to water	Slope, droughty, soil blowing.	Slope, erodes easily, percs slowly.	Slope, erodes easily, droughty.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CuE Cuthbert	Moderate: seepage.	Moderate: piping.	Deep to water	Slope, droughty.	Slope, percs slowly.	Slope, droughty.
DaC Darco	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
DaE Darco	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
EaA, EaB Eastham	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Percs slowly	Percs slowly.
ErB Elrose	Moderate: seepage.	Moderate: hard to pack.	Deep to water	Favorable	Soil blowing	Favorable.
EtB Etoile	Slight	Severe: hard to pack.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
FrB Freestone	Slight	Severe: hard to pack.	Deep to water	Wetness	Wetness, percs slowly.	Percs slowly.
FsA*:						
Freestone	Slight	Severe: hard to pack.	Deep to water	Wetness	Wetness, percs slowly.	Percs slowly.
Derly	Slight	Severe: wetness.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
FuA, FuB Fuller	Moderate: seepage.	Severe: piping, wetness, excess sodium.	Percs slowly, excess sodium.	Wetness, percs slowly.	Erodes easily, wetness, soil blowing.	Wetness, excess sodium, erodes easily.
GaA Garner	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Percs slowly	Percs slowly.
GrB Grapeland	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
HaA Hainesville	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
HbC Hallsbluff	Slight	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Percs slowly	Percs slowly.
Hc Hannahatchee	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing, flooding.	Soil blowing	Favorable.
HeA, HeB Herty	Slight	Severe: wetness.	Percs slowly	Wetness, percs slowly.	Erodes easily, wetness, soil blowing.	Wetness, erodes easily, percs slowly.
Iu Iulus	Moderate: seepage.	Severe: piping.	Flooding	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Erodes easily.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ka, Kb------------ Kaufman	Slight---------	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Percs slowly.
KcE--------------- Kellison	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, soil blowing, percs slowly.	Slope, erodes easily, soil blowing.	Slope, erodes easily, percs slowly.
KeB--------------- Keltys	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing, percs slowly, erodes easily.	Erodes easily, soil blowing, percs slowly.	Erodes easily, percs slowly.
KeD--------------- Keltys	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing, erodes easily.	Erodes easily, soil blowing, percs slowly, slope.	Erodes easily, percs slowly, slope.
KfC--------------- Kirvin	Slight---------	Severe: hard to pack.	Deep to water	Slope----------	Erodes easily	Erodes easily.
KgC--------------- Kirvin	Slight---------	Severe: hard to pack.	Deep to water	Slope, droughty.	Favorable------	Favorable.
KhC--------------- Kirvin	Slight---------	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Favorable------	Favorable.
Ko---------------- Kosse	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Deep to water	Flooding-------	Favorable------	Favorable.
Kp---------------- Koury	Slight---------	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
KuB--------------- Kurth	Moderate: seepage.	Moderate: piping.	Deep to water	Soil blowing, percs slowly.	Soil blowing---	Favorable.
KuD--------------- Kurth	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, soil blowing, percs slowly.	Soil blowing---	Favorable.
LaA, LaB---------- LaCerda	Slight---------	Severe: hard to pack.	Deep to water	Percs slowly---	Percs slowly---	Percs slowly.
LaE--------------- LaCerda	Slight---------	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Lc---------------- Laneville	Slight---------	Moderate: hard to pack, wetness.	Percs slowly, flooding.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
LeB--------------- Latex	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing, percs slowly, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
LtC--------------- Lilbert	Severe: seepage.	Moderate: piping.	Deep to water	Slope, droughty, fast intake.	Soil blowing---	Droughty.
LvC, LvD---------- Lovelady	Severe: seepage.	Moderate: piping.	Slope----------	Slope, droughty.	Soil blowing---	Droughty.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting- Drainage	Irrigation	Terraces and diversions	Grassed waterways
MoA--------------- Mollville	Severe: seepage.	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
MpA*:						
Mollville--------	Severe: seepage.	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Besner-----------	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing---	Soil blowing---	Favorable.
MsB--------------- Moswell	Slight---------	Severe: hard to pack.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
MsE--------------- Moswell	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
MxA*:						
Moten------------	Moderate: seepage.	Severe: piping.	Favorable------	Wetness, soil blowing, percs slowly.	Erodes easily, wetness, soil blowing.	Erodes easily.
Multey-----------	Moderate: seepage.	Severe: thin layer.	Deep to water	Soil blowing---	Soil blowing---	Favorable.
NaG--------------- Naclina	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Nc---------------- Naconiche	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave.	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Nh---------------- Nahatche	Moderate: seepage.	Severe: wetness.	Flooding-------	Wetness, flooding.	Wetness--------	Wetness.
Oz*:						
Ozias------------	Slight---------	Severe: wetness.	Percs slowly, flooding, excess salt.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, excess salt, percs slowly.
Pophers----------	Slight---------	Severe: wetness.	Flooding, excess salt.	Wetness, percs slowly, flooding.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
PeB--------------- Penning	Moderate: seepage.	Severe: piping.	Favorable------	Wetness, percs slowly, erodes easily.	Erodes easily, wetness.	Erodes easily.
PnA--------------- Percilla	Slight---------	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Ponding, percs slowly, erodes easily.	Wetness, percs slowly, erodes easily.
Po---------------- Pophers	Slight---------	Severe: wetness.	Flooding, excess salt.	Wetness, percs slowly, flooding, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
PsA: Porterspring	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
RnB: Rentzel	Severe: seepage.	Severe: piping.	Favorable	Wetness, fast intake.	Wetness, soil blowing.	Favorable.
SaB: Sacul	Slight	Moderate: hard to pack, wetness.	Percs slowly	Wetness	Wetness, soil blowing.	Percs slowly.
SwA*:						
Sawlit	Moderate: seepage.	Severe: hard to pack.	Percs slowly	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
Latex	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing, percs slowly, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
TaE: Tenaha	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, soil blowing.	Slope, droughty.
Te, Tf: Texark	Slight	Severe: hard to pack.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Percs slowly.
ToC: Tonkawa	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
TrE: Trawick	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock, soil blowing.	Slope, depth to rock, soil blowing, erodes easily.	Slope, depth to rock, erodes easily.
TwC: Trawick	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Depth to rock	Depth to rock.
TwE: Trawick	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
TxG*:						
Trawick	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Bub	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty.	Slope, depth to rock.	Slope, droughty.
WnB: Woden	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Soil blowing	Favorable.
WoB: Woodtell	Slight	Severe: hard to pack.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly.
WoE: Woodtell	Slight	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Slope, erodes easily.	Slope, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.--Engineering Index Properties

(The symbol < means less than. Absence of an entry indicates that data were not estimated.)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
AaB: Alazan	0-9	Very fine sandy loam.	ML, CL-ML	A-4	100	96-100	90-100	51-80	<25	NP-7
	9-80	Loam, sandy clay loam.	CL	A-6, A-4	100	96-100	90-100	51-85	25-40	8-22
AbA*:										
Alazan	0-12	Very fine sandy loam.	ML, CL-ML	A-4	100	96-100	90-100	51-80	<25	NP-7
	12-80	Loam, sandy clay loam.	CL	A-6, A-4	100	96-100	90-100	51-85	25-40	8-22
Besner	0-5	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	100	95-100	90-100	29-66	<25	NP-7
	5-28	Fine sandy loam, very fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	100	95-100	90-100	25-66	<25	NP-7
	28-83	Loam, fine sandy loam.	CL-ML, ML, SC-SM, SM	A-4	100	95-100	80-100	25-66	<25	NP-7
AfB: Alto	0-4	Fine sandy loam	SC-SM, SC	A-2-4, A-4	95-100	90-95	80-90	30-50	15-26	4-10
	4-16	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-7	95-100	85-95	75-95	42-65	30-45	15-30
	16-32	Clay loam, sandy clay, very gravelly clay.	CL, SC	A-6, A-7	90-100	45-95	80-95	42-70	30-45	15-30
	32-56	Loam, sandy clay loam, clay loam, very gravelly clay.	CL, SC	A-6, A-7	90-100	45-95	60-85	42-65	32-45	15-25
	56-74	Stratified fine sandy loam to shaly clay.	CL, SC, CH	A-6, A-7, A-2-6, A-2	90-100	65-90	60-90	30-60	30-51	15-30
AnA*: Annona	0-8	Loam	SM, ML, SC-SM, CL-ML	A-4	95-100	95-100	75-100	45-75	16-30	NP-7
	8-34	Clay, clay loam	CH,CL	A-7	95-100	95-100	90-100	75-95	51-70	30-45
	34-89	Clay loam, clay	CL, CH	A-7	95-100	95-100	90-100	75-95	41-65	25-45
AnB: Annona	0-10	Loam	SM, ML, SC-SM, CL-ML	A-4	95-100	95-100	75-100	45-75	16-30	NP-7
	10-38	Clay, clay loam	CH, CL	A-7	95-100	95-100	90-100	75-95	51-70	30-45
	38-82	Clay loam, clay	CL, CH	A-7	95-100	95-100	90-100	75-95	41-65	25-45
AtB: Attoyac	0-16	Fine sandy loam	SC-SM, CL-ML, ML, SM	A-4	98-100	95-100	70-100	40-65	<23	NP-7
	16-80	Fine sandy loam, sandy clay loam, loam.	CL, SC	A-4, A-6	98-100	95-100	80-100	45-75	23-40	7-24

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In								Pct	
AuB: Austonio	0-12	Fine sandy loam	SM, ML, SC, CL	A-4	90-100	90-100	85-95	36-55	20-28	3-10
	12-19	Fine sandy loam	SM, ML, SC, CL	A-4	90-100	90-100	85-95	36-55	20-28	3-10
	19-42	Loam, sandy clay loam.	CL	A-6	100	95-100	90-100	51-75	26-40	12-24
	42-68	Fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	98-100	95-100	80-100	40-70	<28	NP-7
	68-80	Loamy fine sand, fine sandy loam.	SM, SC-SM	A-4, A-2-4	95-100	95-100	85-100	15-45	<25	NP-5
AuD: Austonio	0-4	Fine sandy loam	SM, ML, SC, CL	A-4	90-100	90-100	85-95	36-55	20-28	3-10
	4-11	Fine sandy loam	SM, ML, SC, CL	A-4	90-100	90-100	85-95	36-55	20-28	3-10
	11-52	Loam, sandy clay loam.	CL	A-6	100	95-100	90-100	51-75	26-40	12-24
	52-72	Fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	98-100	95-100	80-100	40-70	<28	NP-7
	72-80	Loamy fine sand, fine sandy loam.	SM, SC-SM	A-4, A-2-4	95-100	95-100	85-100	15-45	<25	NP-5
BaB: Bernaldo	0-5	Fine sandy loam	SM, ML	A-4	100	95-100	90-100	40-60	<25	NP-4
	5-15	Fine sandy loam, very fine sandy loam, loam.	ML, SM, CL-ML	A-4	100	95-100	90-100	40-70	<25	NP-5
	15-49	Loam, sandy clay loam, clay loam.	CL	A-6	99-100	98-100	90-100	51-75	26-40	12-24
	49-84	Fine sandy loam, loam, sandy clay loam.	CL, SC, ML, SM	A-4, A-6, A-2-4	100	95-100	90-100	28-65	20-40	3-22
BbA*:										
Bernaldo	0-5	Fine sandy loam	SM, ML	A-4	100	95-100	90-100	40-60	<25	NP-4
	5-18	Fine sandy loam, very fine sandy loam, loam.	ML, SM, CL-ML	A-4	100	95-100	90-100	40-70	<25	NP-5
	18-41	Loam, sandy clay loam, clay loam.	CL	A-6	99-100	98-100	90-100	51-75	26-40	12-24
	41-80	Fine sandy loam, loam, sandy clay loam.	CL, SC, ML, SM	A-4, A-6, A-2-4	100	95-100	90-100	28-65	20-40	3-22
Besner	0-7	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	100	95-100	90-100	29-66	<25	NP-7
	7-27	Fine sandy loam, very fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	100	95-100	90-100	25-66	<25	NP-7
	27-44	Loam, fine sandy loam.	CL-ML, ML, SC-SM, SM	A-4	100	95-100	80-100	25-66	<25	NP-7
	44-80	Loam, sandy clay loam, fine sandy loam.	SC, CL, CL-ML, SC-SM, ML	A-6, A-4	100	95-100	80-100	29-75	18-30	3-15

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
BeA: Besner	0-10	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	100	95-100	90-100	29-66	<25	NP-7
	10-18	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	100	95-100	90-100	25-66	<25	NP-7
	18-30	Loam, fine sandy loam.	CL-ML, ML, SC-SM, SM	A-4	100	95-100	80-100	25-66	<25	NP-7
	30-80	Loam, sandy clay loam, fine sandy loam.	SC, CL, CL-ML, SC-SM, ML	A-6, A-4	100	95-100	80-100	29-75	18-30	3-15
BtC: Betis	0-10	Loamy fine sand	SM, SP-SM	A-2	100	97-100	90-100	10-35	---	NP
	10-40	Fine sand, loamy fine sand.	SM, SP-SM	A-2	100	97-100	90-100	10-35	---	NP
	40-83	Fine sand, loamy fine sand, fine sandy loam.	SM	A-2, A-4	100	97-100	90-100	25-50	---	NP
BwB: Bowie	0-13	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-2-4, A-4	97-100	94-100	90-100	30-55	<25	NP-6
	13-38	Sandy clay loam, clay loam, fine sandy loam, loam.	SC, CL	A-4, A-6	90-100	87-100	80-100	40-72	20-40	8-25
	38-72	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6, A-2	80-100	70-100	65-100	34-77	20-40	8-25
	72-93	Sandy clay loam, clay loam, sandy clay.	CL	A-6, A-7	95-100	90-100	75-100	51-80	31-49	14-30
ChA: Chireno	0-12	Loam	CL	A-7, A-6	99-100	90-100	90-97	51-85	32-46	14-25
	12-80	Sandy clay loam, clay loam, clay.	CH, CL	A-7	95-100	85-95	65-95	51-85	44-60	23-36
CtE: Cuthbert	0-9	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2-4, A-4	85-100	78-100	75-98	20-55	<32	NP-7
	9-23	Sandy clay loam, sandy clay, clay.	SC, CL, CH	A-6, A-7-6	85-100	75-100	65-100	45-98	37-64	19-40
	23-35	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-7, A-2-6	85-100	80-100	75-100	28-84	29-45	11-26
	35-62	Stratified fine sandy loam to clay.	SC, CL	A-6, A-7, A-2-6	85-100	80-100	75-100	28-84	21-45	7-26
CtG: Cuthbert	0-9	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2-4, A-4	85-100	78-100	75-98	20-55	<32	NP-7
	9-28	Sandy clay loam, sandy clay, clay.	SC, CL, CH	A-6, A-7-6	85-100	75-100	65-100	45-98	37-64	19-40
	28-60	Stratified fine sandy loam to clay.	SC, CL	A-6, A-7, A-2-6	85-100	80-100	75-100	28-84	21-45	7-26

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
CuE------------- Cuthbert	0-5	Gravelly fine sandy loam.	SM, GM, GM-GC, SC-SM	A-1-B, A-2-4, A-4	60-88	50-80	35-75	20-49	<32	NP-7
	5-35	Sandy clay loam, sandy clay, clay.	SC, CL, CH	A-6, A-7-6	85-100	75-100	65-100	45-98	37-64	19-40
	35-60	Stratified fine sandy loam to clay.	SC, CL	A-6, A-7, A-2-6	85-100	80-100	75-100	28-84	21-45	7-26
DaC------------- Darco	0-12	Loamy fine sand	SM	A-2-4	95-100	95-100	75-100	15-30	16-20	NP-3
	12-47	Loamy fine sand	SM	A-2-4	95-100	95-100	75-100	15-30	16-20	NP-3
	47-68	Sandy clay loam, fine sandy loam.	SC, CL	A-6, A-7-6, A-2-4	95-100	95-100	80-100	23-55	25-45	9-28
	68-82	Sandy clay loam, fine sandy loam.	SC, SC-SM	A-2, A-4, A-6	95-100	95-100	75-100	23-50	20-40	5-18
DaE------------- Darco	0-12	Loamy fine sand	SM	A-2-4	95-100	95-100	75-100	15-30	16-20	NP-3
	12-49	Loamy fine sand	SM	A-2-4	95-100	95-100	75-100	15-30	16-20	NP-3
	49-80	Sandy clay loam, fine sandy loam.	SC, CL	A-6, A-7-6, A-2-4	95-100	95-100	80-100	23-55	25-45	9-28
EaA------------- Eastham	0-6	Clay-------------	CL, CH	A-7-6	95-100	95-100	85-100	80-99	45-60	28-40
	6-56	Clay-------------	CH	A-7-6	95-100	95-100	85-100	80-99	51-72	34-48
	56-80	Clay, silty clay	CH	A-7-6	95-100	95-100	80-98	70-98	60-84	40-60
EaB------------- Eastham	0-4	Clay-------------	CL, CH	A-7-6	95-100	95-100	85-100	80-99	45-60	28-40
	4-40	Clay-------------	CH	A-7-6	95-100	95-100	85-100	80-99	51-72	34-48
	40-88	Clay, silty clay	CH	A-7-6	95-100	95-100	80-98	70-98	60-84	40-60
ErB------------- Elrose	0-12	Fine sandy loam	SM, SC-SM	A-2-4, A-4	85-100	78-100	70-99	30-47	16-25	NP-7
	12-42	Sandy clay loam, clay loam, loam.	SC, CL	A-4, A-6	90-100	85-100	80-99	36-65	20-39	8-23
	42-80	Clay loam, sandy clay, clay, fine sandy loam.	CL, CH	A-6, A-7	90-100	80-100	80-100	50-97	32-65	16-37
EtB------------- Etoile	0-4	Loam-------------	CL-ML, ML	A-4	98-100	98-100	85-95	51-85	16-30	NP-7
	4-9	Clay-------------	CH	A-7-6	98-100	98-100	85-100	75-98	51-76	35-50
	9-39	Clay-------------	CH	A-7-6	98-100	98-100	80-100	75-98	51-76	35-50
	39-47	Clay-------------	CH	A-7-6	98-100	98-100	80-100	75-98	51-76	35-50
	47-80	Clay, clay loam	CH	A-7-6	98-100	98-100	80-100	75-98	51-76	35-50
FrB------------- Freestone	0-11	Fine sandy loam	SM, SC-SM, CL-ML, ML	A-4	95-100	95-100	90-100	36-62	15-26	NP-7
	11-40	Sandy clay loam, loam, clay loam.	CL, CL-ML	A-6, A-7, A-4	95-100	95-100	90-100	55-85	24-46	7-23
	40-81	Clay, clay loam	CL, CH	A-7	95-100	95-100	90-100	65-95	42-70	21-44
FsA*:										
Freestone-------	0-21	Fine sandy loam	SM, SC-SM, CL-ML, ML	A-4	95-100	95-100	90-100	36-62	15-26	NP-7
	21-32	Sandy clay loam, loam, clay loam.	CL, CL-ML	A-6, A-7, A-4	95-100	95-100	90-100	55-85	24-46	7-23
	32-85	Clay, clay loam	CL, CH	A-7	95-100	95-100	90-100	65-95	42-70	21-44

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
FsA*:										
Derly	0-12	Loam	ML, CL, CL-ML	A-4	100	100	85-100	55-90	<30	NP-10
	12-23	Clay loam, silty clay loam, clay.	CL, CH	A-7, A-6	100	100	90-100	70-95	35-60	20-36
	23-64	Clay loam, silty clay loam, clay.	CH, CL	A-7, A-6	100	100	90-100	75-95	39-60	26-36
	64-80	Loam, clay loam, clay.	CH, CL	A-7, A-6	100	100	90-100	56-95	34-60	20-36
FuA: Fuller	0-4	Fine sandy loam	ML, CL-ML, SM, SC-SM	A-4	98-100	98-100	95-100	40-60	16-25	NP-7
	4-26	Fine sandy loam, very fine sandy loam, loam.	ML, CL-ML, SM, SC-SM	A-4	98-100	98-100	95-100	40-60	16-25	NP-7
	26-44	Loam, clay loam, silty clay loam.	CL, CH	A-6, A-7-6	98-100	98-100	95-100	51-75	35-60	15-40
	44-66	Loam, clay loam, clay, silty clay loam.	CH, CL	A-7, A-6	95-100	95-100	90-100	70-95	36-65	17-41
FuB: Fuller	0-7	Fine sandy loam	ML, CL-ML, SM, SC-SM	A-4	98-100	98-100	95-100	40-60	16-25	NP-7
	7-27	Fine sandy loam, very fine sandy loam, loam.	ML, CL-ML, SM, SC-SM	A-4	98-100	98-100	95-100	40-60	16-25	NP-7
	27-51	Loam, clay loam, silty clay loam.	CL, CH	A-6, A-7-6	98-100	98-100	95-100	51-75	35-60	15-40
	51-65	Loam, clay loam, clay, silty clay loam.	CH, CL	A-7, A-6	95-100	95-100	90-100	70-95	36-65	17-41
GaA: Garner	0-7	Clay	CL, CH	A-6, A-7-6	95-100	95-100	67-100	65-100	34-58	18-37
	7-45	Clay, silty clay	CH	A-7-6	95-100	95-100	85-100	80-100	51-75	31-51
	45-80	Clay, silty clay	CH	A-7-6	95-100	95-100	85-100	80-100	51-75	31-51
GrB: Grapeland	0-12	Fine sand	SM, SC-SM, SP-SM	A-2-4	100	98-100	85-100	10-30	<25	NP-5
	12-80	Loamy sand, loamy fine sand, fine sand.	SM, SC-SM	A-2-4, A-4	100	98-100	80-100	13-45	<25	NP-7
HaA: Hainesville	0-14	Fine sand	SM, SC-SM, SW-SM	A-2-4	98-100	95-100	80-100	10-30	<25	NP-5
	14-80	Fine sand, loamy fine sand.	SM, SC-SM	A-2-4, A-4	98-100	95-100	80-100	13-45	<25	NP-7
HbC: Hallsbluff	0-6	Clay loam	CH, CL	A-7-6	95-100	95-100	85-100	80-99	45-60	28-40
	6-17	Silty clay, clay	CH	A-7-6	95-100	95-100	85-100	80-99	51-72	34-48
	17-29	Silty clay, clay	CH	A-7-6	95-100	95-100	85-100	80-99	51-72	34-48
	29-80	Clay, silty clay	CH	A-7-6	95-100	95-100	80-100	70-99	60-84	40-60
Hc: Hannahatchee	0-23	Fine sandy loam	SC-SM, CL-ML, CL	A-4, A-6	98-100	96-100	70-90	40-65	16-30	3-11
	23-39	Fine sandy loam, loam, sandy clay loam, very fine sandy loam.	CL-ML, SC, CL	A-4, A-6	98-100	96-100	85-90	45-65	20-31	5-12
	39-76	Loam, sandy clay loam, clay loam.	CL-ML, SC, CL	A-4, A-6, A-7	97-100	85-100	85-95	45-75	23-43	7-18

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In								Pct	
HeA--------------	0-8	Loam-------------	CL, CL-ML	A-4, A-6	98-100	98-100	95-100	51-90	18-35	4-15
Herty	8-18	Clay loam, clay, silty clay.	CL	A-6, A-7-6	98-100	98-100	95-100	75-95	30-50	15-32
	18-47	Clay, silty clay	CH, CL	A-7-6, A-6	98-100	98-100	95-100	75-95	36-53	20-35
	47-80	Clay loam, clay	CH	A-7-6	95-100	95-100	90-100	65-95	51-75	30-50
HeB--------------	0-10	Loam, silt loam	CL, CL-ML	A-4, A-6	98-100	98-100	95-100	51-90	18-35	4-15
Herty	10-24	Clay loam, clay, silty clay.	CL	A-6, A-7-6	98-100	98-100	95-100	75-95	30-50	15-32
	24-45	Clay, silty clay	CH, CL	A-7-6, A-6	98-100	98-100	95-100	75-95	36-53	20-35
	45-80	Clay loam, clay	CH	A-7-6	95-100	95-100	90-100	65-95	51-75	30-50
Iu---------------	0-7	Fine sandy loam	CL-ML, ML	A-4	95-100	95-100	85-95	51-75	16-25	NP-6
Iulus	7-27	Fine sandy loam, loam.	CL-ML, SC-SM, SM, ML	A-4	95-100	85-100	80-95	45-75	16-25	NP-6
	27-82	Fine sandy loam, loam, sandy clay loam.	CL-ML, CL, ML, SC	A-4, A-6	95-100	90-100	80-95	45-75	16-32	3-15
Ka---------------	0-3	Clay-------------	CH	A-7-6, A-7-5	100	100	90-100	80-100	56-96	33-62
Kaufman	3-62	Clay-------------	CH	A-7-6, A-7-5	100	100	95-100	90-100	65-102	45-71
	62-90	Clay-------------	CH	A-7-6, A-7-5	100	100	95-100	85-100	64-102	45-71
Kb---------------	0-7	Clay-------------	CH	A-7-5, A-7-6	100	100	90-100	80-100	56-96	35-60
Kaufman	7-62	Clay-------------	CH	A-7-5	100	100	95-100	90-100	65-100	35-65
	62-80	Clay-------------	CH	A-7-5, A-7-6	100	100	95-100	85-100	65-100	35-65
KcE--------------	0-3	Loam-------------	CL, CL-ML	A-4, A-6	98-100	98-100	95-100	51-90	18-35	4-15
Kellison	3-7	Very fine sandy loam, loam.	CL, CL-ML	A-4, A-6	98-100	98-100	95-100	51-90	18-35	4-15
	7-22	Clay loam, silty clay, clay.	CH, CL	A-6, A-7-6	100	98-100	90-100	70-95	36-53	20-35
	22-47	Silty clay, clay	CH, CL	A-6, A-7-6	100	98-100	90-100	75-95	36-60	20-40
	47-65	Clay loam, clay	CH, CL	A-7-6	98-100	95-100	90-100	70-95	48-75	28-50
KeB--------------	0-6	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	98-100	98-100	85-100	36-61	16-30	1-7
Keltys	6-18	Fine sandy loam, loamy very fine sand.	SM, SC-SM, ML, CL-ML	A-4	98-100	98-100	85-100	36-61	16-30	1-8
	18-57	Fine sandy loam, loam, clay loam.	SC, SC-SM, CL,CL-ML, ML	A-4	98-100	98-100	85-100	36-61	20-30	1-10
	57-80	Clay loam, clay	SC, SC-SM, CL, CL-ML	A-4, A-6, A-7	95-100	95-100	85-100	45-80	34-46	14-25
KeD--------------	0-8	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	98-100	98-100	85-100	36-61	16-30	1-7
Keltys	8-17	Fine sandy loam, loamy very fine sand.	SM, SC-SM, ML, CL-ML	A-4	98-100	98-100	85-100	36-61	16-30	1-8
	17-53	Fine sandy loam, sandy clay loam.	SC, SC-SM, CL,CL-ML, ML	A-4	98-100	98-100	85-100	36-61	20-30	1-10
	53-80	Clay loam, clay	SC, SC-SM, CL, CL-ML	A-4, A-6, A-7	95-100	95-100	85-100	45-80	34-46	14-25

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In								Pct	
KfC-------------- Kirvin	0-11	Fine sandy loam	SM, ML, CL, SC	A-4	95-100	95-98	90-95	36-70	<30	NP-8
	11-46	Clay loam, sandy clay, clay.	CL, CH	A-7	95-100	90-100	85-100	53-95	42-67	24-43
	46-56	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7	95-100	90-100	75-100	51-90	32-59	16-32
	56-74	Stratified sandy clay loam to clay.	SC, CL, CH	A-4, A-6, A-7	95-100	90-100	50-90	36-80	25-52	9-32
KgC-------------- Kirvin	0-11	Gravelly fine sandy loam.	SM, GM, SC, GM-GC	A-2-4, A-4	55-92	47-80	40-75	25-49	<30	NP-8
	11-38	Clay loam, sandy clay, clay.	CL, CH	A-7	95-100	90-100	85-100	53-95	42-67	24-43
	38-48	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7	95-100	90-100	75-100	51-90	32-59	16-32
	48-60	Stratified sandy clay loam to clay.	SC, CL, CH	A-4, A-6, A-7	95-100	90-100	50-90	36-80	25-52	9-32
KhC-------------- Kirvin	0-4	Clay loam--------	CL, CH	A-6, A-7	95-100	90-100	85-99	51-80	32-52	16-32
	4-36	Clay, sandy clay, clay loam.	CL, CH	A-7	95-100	88-100	84-99	51-95	45-67	24-43
	36-45	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7	95-100	90-100	85-99	51-90	32-52	16-32
	45-70	Stratified sandy clay loam to clay.	SC, CL, CH	A-4, A-6, A-7	95-100	90-100	50-90	36-80	25-52	9-32
Ko--------------- Kosse	0-15	Sandy clay loam	CL	A-4, A-6, A-7-6	95-100	95-100	80-100	55-80	28-42	9-21
	15-44	Sandy clay loam, clay loam.	CL	A-4, A-6, A-7-6	95-100	95-100	80-100	60-80	28-41	9-21
	44-80	Fine sandy loam, loam, sandy clay loam.	CL-ML, SC, CL	A-4	95-100	95-100	75-98	40-75	20-29	5-10
Kp--------------- Koury	0-9	Silt loam--------	CL-ML, ML, CL	A-4	98-100	98-100	95-100	55-95	20-31	3-10
	9-54	Loam, silt loam, very fine sandy loam.	CL-ML, ML, CL	A-4, A-6	98-100	98-100	95-100	65-95	20-31	3-11
	54-80	Loam, silt loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	98-100	98-100	95-100	65-95	20-40	4-20
KuB-------------- Kurth	0-6	Fine sandy loam	SM, SC-SM	A-2-4, A-4	98-100	98-100	85-100	25-50	<30	NP-7
	6-20	Fine sandy loam	SM, SC-SM, ML	A-2-4, A-4	98-100	98-100	85-100	25-50	<30	NP-7
	20-28	Sandy clay loam, fine sandy loam.	SC, SC-SM, CL, CL-ML	A-4	98-100	96-100	85-100	40-80	20-30	4-10
	28-40	Sandy clay loam, fine sandy loam.	CL	A-6, A-7	98-100	96-100	85-100	51-80	25-49	11-30
	40-80	Fine sandy loam, sandy clay loam, clay loam.	SC, CL, CH	A-6, A-7	98-100	95-100	85-100	40-83	25-53	11-35

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In								Pct	
KuD:										
Kurth	0-6	Fine sandy loam	SM, SC-SM	A-2-4, A-4	98-100	98-100	85-100	25-50	<30	NP-7
	6-22	Fine sandy loam	SM, SC-SM, ML	A-2-4, A-4	98-100	98-100	85-100	25-50	<30	NP-7
	22-29	Sandy clay loam, fine sandy loam.	SC, SC-SM, CL, CL-ML	A-4	98-100	96-100	85-100	40-80	20-30	4-10
	29-40	Sandy clay loam, fine sandy loam.	CL	A-6, A-7	98-100	96-100	85-100	51-80	25-49	11-30
	40-80	Fine sandy loam, sandy clay loam, Clay loam.	SC, CL	A-6, A-7	98-100	95-100	85-100	40-83	25-53	11-35
LaA:										
LaCerda	0-4	Clay loam	CL	A-6, A-7	98-100	96-100	95-100	80-98	30-50	15-30
	4-47	Silty clay, clay	CH	A-7	98-100	96-100	95-100	85-98	51-70	30-45
	47-80	Clay, clay loam	CH	A-7	100	100	95-100	80-98	51-70	30-45
LaB:										
LaCerda	0-4	Clay loam	CL	A-6, A-7	98-100	96-100	95-100	80-98	30-50	15-30
	4-49	Silty clay, clay	CH	A-7	98-100	96-100	95-100	85-98	51-70	30-45
	49-80	Clay, clay loam	CH	A-7	100	100	95-100	80-98	51-70	30-45
LaE:										
LaCerda	0-3	Clay loam	CL	A-6, A-7	98-100	96-100	95-100	80-98	30-50	15-30
	3-43	Silty clay, clay	CH	A-7	98-100	96-100	95-100	85-98	51-70	30-45
	43-80	Clay	CH	A-7	100	100	95-100	80-98	51-70	30-45
Lc:										
Laneville	0-12	Loam	CL-ML, ML, CL	A-4, A-6	100	95-100	90-100	80-95	18-40	3-20
	12-34	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	100	95-100	90-100	85-98	20-40	6-20
	34-87	Clay loam, clay	CL, CH	A-6, A-7	100	95-100	90-100	85-98	35-55	20-35
LeB:										
Latex	0-4	Loam	SM, SC-SM, SC, CL-ML	A-4	99-100	96-100	90-100	45-75	19-30	2-9
	4-35	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	99-100	95-100	90-100	51-80	20-40	6-25
	35-80	Clay, silty clay, clay loam.	CH, CL	A-7-6	99-100	95-100	90-100	75-98	41-70	20-43
LtC:										
Lilbert	0-5	Loamy fine sand	SM	A-2-4, A-4	95-100	95-100	80-100	17-40	<20	NP-3
	5-27	Loamy fine sand	SM, ML	A-2-4, A-4	95-100	95-100	80-100	17-40	<20	NP-3
	27-38	Fine sandy loam, sandy clay loam.	SC, CL	A-6, A-4	95-100	95-100	85-100	36-55	23-39	8-22
	38-80	Sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-4	90-100	90-100	85-100	35-75	22-39	8-22
LvC:										
Lovelady	0-11	Loamy sand	SM	A-2-4	95-100	95-100	65-95	15-35	<20	NP-3
	11-26	Loamy sand, loamy fine sand.	SM	A-2-4	95-100	95-100	65-95	15-35	<20	NP-3
	26-62	Fine sandy loam, sandy clay loam.	SC, CL, SC-SM	A-6, A-4	95-100	90-100	70-95	35-60	20-40	5-20
	62-76	Sandy clay loam, clay loam, clay.	CL, CH, SC	A-6, A-7	90-100	90-100	75-99	35-60	26-52	11-30
	76-80	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6, A-7	90-100	85-100	75-99	35-60	25-50	9-30

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
LvD-------------- Lovelady	0-4	Loamy sand-------	SM	A-2-4	95-100	95-100	65-95	15-35	<20	NP-3
	4-24	Loamy sand, loamy fine sand.	SM	A-2-4	95-100	95-100	65-95	15-35	<20	NP-3
	24-41	Fine sandy loam, sandy clay loam.	SC, CL, SC-SM	A-6, A-4	98-100	90-100	70-95	35-60	20-40	5-20
	41-67	Sandy clay loam, clay loam, clay.	CL, CH, SC	A-6, A-7	90-100	90-100	75-99	35-60	26-52	11-30
	67-81	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6, A-7	90-100	85-100	75-99	35-60	25-50	9-30
MoA-------------- Mollville	0-10	Loam-------------	ML, CL-ML, CL	A-4, A-6	100	100	85-100	50-80	20-35	3-15
	10-63	Sandy clay loam, loam, clay loam.	CL, SC	A-6, A-4	100	100	90-100	45-75	25-40	8-22
	63-84	Clay loam, sandy clay loam, loam.	CL, SC	A-6	100	100	90-100	45-80	30-40	11-20
MpA*:										
Mollville-------	0-14	Loam-------------	ML, CL-ML, CL	A-4, A-6	100	100	85-100	50-80	20-35	3-15
	14-44	Sandy clay loam, loam, clay loam.	CL, SC	A-6, A-4	100	100	90-100	45-75	25-40	8-22
	44-52	Clay loam, sandy clay loam, loam.	CL, SC	A-6	100	100	90-100	45-80	30-40	11-20
	52-80	Loamy fine sand, fine sandy loam.	SM, ML, SC-SM, CL-ML	A-2-4, A-4	95-100	95-100	70-95	15-68	15-25	NP-6
Besner----------	0-5	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	100	95-100	90-100	29-66	<25	NP-7
	5-36	Fine sandy loam, very fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	100	95-100	90-100	25-66	<25	NP-7
	36-61	Loam, fine sandy loam.	CL-ML, ML, SC-SM, SM	A-4	100	95-100	80-100	25-66	<25	NP-7
	61-80	Loam, sandy clay loam, fine sandy loam.	SC, CL, CL-ML, SC-SM, ML	A-6, A-4	100	95-100	80-100	29-75	18-30	3-15
MsB-------------- Moswell	0-6	Loam-------------	ML, CL-ML	A-4	97-100	95-100	80-95	51-70	<30	NP-7
	6-17	Clay-------------	CH	A-7	97-100	95-100	90-100	85-99	65-95	35-65
	17-46	Clay-------------	CH	A-7	97-100	95-100	90-100	85-99	70-95	40-65
	46-80	Stratified clay loam to clay.	CH	A-7	97-100	95-100	90-100	85-99	70-95	55-70
MsE-------------- Moswell	0-6	Loam-------------	ML, CL-ML	A-4	97-100	95-100	80-95	51-70	<30	NP-7
	6-22	Clay-------------	CH	A-7	97-100	95-100	90-100	85-99	65-95	35-65
	22-47	Clay-------------	CH	A-7	97-100	95-100	90-100	85-99	70-95	40-65
	47-80	Stratified clay loam to clay.	CH	A-7	97-100	95-100	90-100	85-99	70-95	55-70

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
MxA*:										
Moten	0-4	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-4	98-100	98-100	95-100	40-65	<20	NP-7
	4-23	Fine sandy loam, very fine sandy loam, loam, silt loam.	CL-ML, ML, SM, SC-SM	A-4	98-100	98-100	95-100	40-65	<30	NP-7
	23-38	Fine sandy loam, loam, silt loam.	CL-ML, CL	A-4, A-6	98-100	98-100	90-100	51-80	18-30	4-12
	38-64	Fine sandy loam, loam, silt loam.	CL-ML, CL, SC, SC-SM	A-4, A-6, A-7	98-100	98-100	85-100	40-85	20-45	5-20
	64-80	Fine sandy loam, loam, silt loam, clay loam.	CL-ML, CL, SC, SC-SM	A-4, A-6, A-7	98-100	98-100	85-100	40-90	20-50	5-20
Multey	0-5	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	98-100	98-100	90-100	40-60	<30	NP-7
	5-22	Fine sandy loam, very fine sandy loam, loam.	ML, CL-ML, SC-SM, SM	A-4	98-100	98-100	90-100	40-60	<30	NP-7
	22-39	Fine sandy loam, very fine sandy loam, loam.	CL-ML, CL, SC-SM, SC	A-4, A-6	98-100	98-100	90-100	45-65	22-34	5-15
	39-57	Sandy clay loam, very fine sandy loam, fine sandy loam.	CL	A-4, A-6	98-100	98-100	90-100	51-70	25-40	8-20
	57-80	Fine sandy loam, sandy clay loam, loam, very fine sandy loam.	ML, CL, SM, SC	A-4, A-6, A-2-4, A-2-6	98-100	95-100	60-100	30-80	20-40	3-18
NaG Naclina	0-3	Clay loam	CL	A-6, A-7	98-100	96-100	95-100	80-98	30-50	15-30
	3-41	Clay	CH	A-7-6	98-100	96-100	95-100	85-98	58-76	35-50
	41-80	Clay	CH	A-7-6	98-100	96-100	95-100	80-98	58-76	35-50
Nc Naconiche	0-8	Mucky sandy loam	SM, SC-SM	A-4, A-2-4	98-100	95-100	80-100	25-50	15-25	NP-6
	8-25	Loamy fine sand	SP-SM, SM, SC-SM	A-2-4	98-100	95-100	75-98	10-35	15-25	NP-6
	25-80	Stratified sand to fine sandy loam.	SP-SM, SM, SC-SM	A-2-4	98-100	95-100	70-98	10-35	15-25	NP-6
Nh Nahatche	0-9	Loam	CL	A-6, A-7, A-4	100	100	90-100	54-92	25-47	8-25
	9-54	Loam, clay loam, silty clay loam.	CL	A-6, A-4	100	100	85-100	60-90	25-40	8-20
	54-80	Stratified loam to silty clay loam.	CL	A-6, A-7	100	100	90-100	60-90	30-45	11-25
Oz*:										
Ozias	0-5	Silty clay loam	CL, CH	A-7	98-100	98-100	96-100	80-98	41-55	20-33
	5-63	Silty clay loam, silty clay, clay loam, clay.	CH, CL	A-7	99-100	98-100	97-100	85-100	45-70	20-40
	63-80	Silty clay loam, silty clay, clay.	CH	A-7	99-100	98-100	97-100	85-100	51-70	25-40

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
Oz*:										
Pophers---------	0-18	Silty clay loam	CL	A-6, A-7	98-100	98-100	96-100	80-98	25-45	11-20
	18-30	Silty clay loam, silt loam, loam.	CL	A-6, A-7	98-100	98-100	96-100	80-98	25-45	12-30
	30-80	Silty clay loam, clay loam, silty clay.	CL	A-6, A-7	98-100	98-100	96-100	80-98	25-45	12-30
PeB-------------- Penning	0-4	Very fine sandy loam.	ML, CL-ML, CL	A-4	100	95-100	90-100	60-85	16-25	3-10
	4-19	Very fine sandy loam, loam.	ML, CL-ML, CL	A-4	100	95-100	90-100	60-85	16-25	3-10
	19-38	Very fine sandy loam, loam, sandy clay loam.	CL, CL-ML	A-4, A-6	98-100	95-100	90-100	65-90	20-35	4-15
	38-56	Loam, sandy clay loam, very fine sandy loam.	CL, CL-ML	A-4, A-6, A-7-6	98-100	95-100	90-100	65-90	25-45	6-22
	56-70	Clay loam, clay	CL, CH	A-7-6	98-100	95-100	90-100	70-99	41-65	22-40
PnA-------------- Percilla	0-4	Clay loam--------	CL	A-6, A-7	95-100	95-100	90-100	55-90	30-35	12-28
	4-83	Clay, clay loam	CH, CL	A-7, A-6	95-100	95-100	90-100	65-95	35-60	17-35
Po--------------- Pophers	0-16	Silt loam	CL	A-6	98-100	98-100	96-100	80-98	25-40	11-20
	16-30	Silty clay loam, silt loam, loam.	CL	A-6, A-7	98-100	98-100	96-100	80-98	25-45	12-30
	30-82	Silty clay loam, clay loam, silty clay.	CL	A-6, A-7	98-100	98-100	96-100	80-98	25-45	12-30
PsA-------------- Portersprings	0-16	Fine sandy loam	SM, SC-SM, SC	A-4, A-2-4, A-2-6	100	95-100	85-100	30-49	21-34	4-15
	16-42	Loam, clay loam, fine sandy loam, sandy clay loam.	SC, CL	A-6, A-4, A-7	100	95-100	85-100	45-75	28-46	9-25
	42-72	Loamy fine sand, fine sandy loam, sandy clay loam.	SM, SC-SM, SC	A-2-4, A-2-6, A-4	100	95-100	85-100	26-49	16-32	2-114
	72-87	Fine sand--------	SM, SP-SM	A-2-4	100	95-100	65-99	11-25	15-25	NP-10
RnB-------------- Rentzel	0-6	Loamy fine sand	SM	A-2-4, A-4	97-100	95-100	75-98	15-40	<30	NP-4
	6-26	Loamy fine sand	SM	A-2-4, A-4	97-100	95-100	75-98	15-40	<30	NP-4
	26-80	Sandy clay loam, fine sandy loam.	SC, CL, SC-SM, CL-ML	A-6, A-4, A-7	95-100	90-100	75-98	36-55	20-43	4-22
SaB-------------- Sacul	0-8	Fine sandy loam	SM, SC-SM	A-4, A-2	75-100	75-100	45-85	25-50	15-25	NP-7
	8-16	Sandy loam, fine sandy loam, loamy fine sand.	SM, ML, SC-SM, CL-ML	A-2, A-4, A-1	75-100	75-100	40-95	12-75	15-30	NP-10
	16-48	Clay, silty clay, clay loam.	CH, CL, SC	A-7	85-100	85-100	70-100	40-95	45-70	20-40
	48-65	Silty clay loam, clay loam, loam, fine sandy loam.	CL, SC	A-6, A-7, A-4, A-2	85-100	85-100	65-100	30-95	25-48	8-25

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In								Pct	
SwA*:										
Sawlit----------	0-7	Loam-------------	ML, CL, CL-ML	A-4	96-100	95-100	85-100	51-75	18-30	NP-10
	7-22	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	96-100	95-100	85-100	60-85	20-40	5-20
	22-33	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	96-100	95-100	85-100	65-90	24-40	6-22
	33-80	Clay loam, clay	CL, CH	A-7-6, A-6	96-100	95-100	85-100	65-95	39-65	20-45
Latex-----------	0-6	Fine sandy loam	SM, SC-SM, SC, CL-ML	A-4	99-100	96-100	90-100	45-75	19-30	2-9
	6-20	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	99-100	95-100	90-100	51-80	20-40	6-25
	20-61	Loam, clay loam, sandy clay loam.	CL-ML, CL, SC, SC-SM	A-4, A-6	75-100	64-98	62-95	41-80	20-40	6-25
	61-80	Clay, silty clay, clay loam.	CH, CL	A-7-6	99-100	95-100	90-100	75-98	41-70	20-43
TaE-------------- Tenaha	0-4	Loamy fine sand	SM	A-2-4, A-4	95-100	95-100	70-95	15-40	16-20	NP-3
	4-23	Loamy fine sand, fine sand.	SM	A-2-4, A-4	95-100	78-100	70-95	15-40	16-20	NP-3
	23-58	Fine sandy loam, sandy clay loam, clay loam, loam.	SC, CL	A-6, A-4, A-7-6	95-100	95-100	80-100	36-66	25-46	8-26
	58-80	Stratified fine sandy loam to clay loam.	SC, CL	A-6, A-7, A-2-6	89-100	85-100	80-100	28-84	25-45	11-26
Te--------------- Texark	0-16	Clay-------------	CH	A-7-6, A-7-5	100	100	95-100	90-100	56-102	33-64
	16-56	Clay-------------	CH	A-7-6, A-7-5	100	100	95-100	90-100	60-96	40-62
	56-80	Clay, silty clay	CH	A-7-6, A-7-5	100	100	95-100	90-100	60-96	40-62
Tf--------------- Texark	0-13	Clay-------------	CH	A-7-6, A-7-5	100	100	95-100	90-100	56-102	33-64
	13-52	Clay-------------	CH	A-7-6, A-7-5	100	100	95-100	90-100	60-96	40-62
	52-80	Clay, silty clay	CH	A-7-6, A-7-5	100	100	95-100	90-100	60-96	40-62
ToC-------------- Tonkawa	0-6	Fine sand--------	SP-SM	A-3, A-2	100	97-100	90-100	6-12	<25	NP-3
	6-82	Fine sand, sand	SP-SM	A-3, A-2	100	95-100	90-100	6-12	<25	NP-3
TrE-------------- Trawick	0-4	Fine sandy loam	SC, CL-ML, CL, SC-SM	A-2-4, A-4	90-100	90-100	85-95	25-55	20-30	4-10
	4-39	Clay, clay loam	CL, CH	A-7	90-100	75-98	70-85	51-75	41-60	18-30
	39-43	Weathered bedrock	---	---	---	---	---	---	---	---
TwC-------------- Trawick	0-10	Gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC-SM	A-2-4, A-4	70-80	65-80	60-70	20-40	20-30	2-7
	10-38	Clay, clay loam	CL, CH	A-7	90-100	75-98	70-85	51-75	41-60	18-30
	38-48	Weathered bedrock	---	---	---	---	---	---	---	---
TwE-------------- Trawick	0-4	Gravelly fine sandy loam.	SM, SC-SM	A-2-4, A-4	70-80	65-80	60-70	20-40	20-30	2-7
	4-38	Clay, clay loam	CL, CH	A-7	90-100	75-98	70-85	51-75	41-60	18-30
	38-56	Weathered bedrock	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
TxG*:										
Trawick	0-4	Gravelly fine sandy loam.	SM, SC-SM	A-2-4, A-4	70-80	65-80	60-70	20-40	20-30	2-7
	4-38	Clay, clay loam	CL, CH	A-7	90-100	75-98	70-85	51-75	41-60	18-30
	38-60	Weathered bedrock	---	---	---	---	---	---	---	---
Bub	0-6	Fine sandy loam	GC, SC, CL	A-2, A-6, A-4	2-5	35-95	30-80	30-65	25-40	8-18
	6-19	Clay, gravelly clay.	CH, GC, CL, SC	A-7	50-85	50-85	45-85	36-75	41-60	20-35
	19-30	Weathered bedrock	---	---	---	---	---	---	---	---
WnB: Woden	0-12	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	98-100	98-100	70-85	40-65	<23	NP-7
	12-80	Fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	98-100	98-100	70-85	40-65	<23	NP-7
WoB: Woodtell	0-5	Very fine sandy loam.	CL, SC-SM, CL-ML, ML	A-4, A-6	95-100	90-100	75-100	40-75	20-33	3-13
	5-25	Clay, sandy clay, clay loam.	CL, CH	A-7-6	100	90-100	80-100	60-98	40-75	25-46
	25-56	Sandy clay, clay loam, clay.	CL, CH	A-6, A-7-6	100	80-100	75-100	51-98	35-65	15-45
	56-80	Stratified sandy clay loam to clay.	CL, CH, SC	A-6, A-7-5, A-7-6	85-100	80-100	60-100	36-95	32-76	13-45
WoE: Woodtell	0-6	Very fine sandy loam.	CL, SC-SM, CL-ML, ML	A-4, A-6	95-100	90-100	75-100	40-75	20-33	3-13
	6-29	Clay, sandy clay, clay loam.	CL, CH	A-7-6	100	90-100	80-100	60-98	40-75	25-46
	29-48	Sandy clay, clay loam, clay.	CL, CH	A-6, A-7-6	100	80-100	75-100	51-98	35-65	15-45
	48-80	Stratified sandy clay loam to clay.	CL, CH, SC	A-6, A-7-5, A-7-6	85-100	80-100	60-100	36-95	32-76	13-45

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.--Physical and Chemical Properties of the Soils

(The symbol < means less than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated.)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
AaB--------------	0-9	5-15	1.40-1.65	2.0-6.0	0.11-0.16	4.5-6.0	0-2	Low-------	0.37	5	3	.5-2
Alazan	9-80	18-25	1.45-1.70	0.6-2.0	0.12-0.18	4.5-6.5	0-2	Low-------	0.37			
AbA*:												
Alazan----------	0-12	5-15	1.40-1.65	2.0-6.0	0.11-0.16	4.5-6.0	0-2	Low-------	0.37	5	3	.5-2
	12-80	18-25	1.45-1.70	0.6-2.0	0.12-0.18	4.5-6.5	0-2	Low-------	0.37			
Besner----------	0-5	4-15	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	0-0	Low-------	0.24	5	3	.5-2
	5-28	4-17	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	0-0	Low-------	0.24			
	28-83	14-18	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	0-0	Low-------	0.32			
AfB--------------	0-4	15-25	1.30-1.40	0.6-2.0	0.11-0.15	5.6-7.3	0-0	Low-------	0.32	5	5	.5-1
Alto	4-16	25-35	1.35-1.45	0.6-2.0	0.13-0.17	5.1-6.5	0-0	Moderate	0.32			
	16-32	27-45	1.40-1.60	0.2-0.6	0.14-0.18	5.1-7.3	0-0	Moderate	0.32			
	32-56	25-35	1.45-1.65	0.6-2.0	0.12-0.16	5.1-7.3	0-0	Moderate	0.32			
	56-74	15-40	1.50-1.70	0.2-0.6	0.10-0.14	5.6-7.8	0-0	Moderate	0.32			
AnA*-------------	0-8	5-18	1.20-1.40	0.6-2.0	0.11-0.15	5.1-6.5	0-2	Low-------	0.37	5	3	.1-2
Annona	8-34	40-60	1.30-1.50	<0.06	0.12-0.18	4.5-5.5	0-2	High------	0.32			
	34-89	35-60	1.30-1.50	<0.06	0.12-0.18	5.6-8.4	0-2	High------	0.32			
AnB--------------	0-10	5-18	1.20-1.40	0.6-2.0	0.11-0.15	5.1-6.5	0-2	Low-------	0.37	5	3	.1-2
Annona	10-38	40-60	1.30-1.50	<0.06	0.12-0.18	4.5-5.5	0-2	High------	0.32			
	38-82	35-60	1.30-1.50	<0.06	0.12-0.18	5.6-8.4	0-2	High------	0.32			
AtB--------------	0-16	8-20	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.0	<2	Low-------	0.28	5	3	<1
Attoyac	16-80	18-25	1.40-1.65	0.6-2.0	0.13-0.18	5.1-6.0	<2	Low-------	0.32			
AuB--------------	0-12	5-15	1.25-1.40	2.0-6.0	0.11-0.15	5.1-6.5	0-2	Low-------	0.20	5	3	.5-2
Austonio	12-19	5-15	1.25-1.40	2.0-6.0	0.11-0.15	4.5-6.5	0-2	Low-------	0.32			
	19-42	18-30	1.35-1.60	0.6-2.0	0.12-0.16	4.5-6.0	0-2	Moderate	0.32			
	42-68	5-18	1.35-1.60	0.6-2.0	0.12-0.16	4.5-6.5	0-2	Low-------	0.32			
	68-80	3-15	1.45-1.65	2.0-6.0	0.07-0.12	4.5-6.5	0-2	Low-------	0.20			
AuD--------------	0-4	5-15	1.25-1.40	2.0-6.0	0.11-0.15	5.1-6.5	0-2	Low-------	0.20	5	3	.5-2
Austonio	4-11	5-15	1.25-1.40	2.0-6.0	0.11-0.15	4.5-6.5	0-2	Low-------	0.32			
	11-52	18-30	1.35-1.60	0.6-2.0	0.12-0.16	4.5-6.5	0-2	Moderate	0.32			
	52-72	5-18	1.35-1.60	0.6-2.0	0.12-0.16	4.5-6.5	0-2	Low-------	0.32			
	72-80	3-15	1.45-1.65	2.0-6.0	0.07-0.12	4.5-6.5	0-2	Low-------	0.20			
BaB--------------	0-5	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low-------	0.28	5	3	.5-2
Bernaldo	5-15	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low-------	0.32			
	15-49	18-30	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.5	<2	Moderate	0.32			
	49-84	10-30	1.45-1.65	0.6-2.0	0.13-0.18	4.5-6.5	<2	Low-------	0.32			
BbA*:												
Bernaldo--------	0-5	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low-------	0.28	5	3	.5-2
	5-18	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low-------	0.32			
	18-41	18-30	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.5	<2	Moderate	0.32			
	41-80	10-30	1.45-1.65	0.6-2.0	0.13-0.18	4.5-6.5	<2	Low-------	0.32			
Besner----------	0-7	4-15	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	0-0	Low-------	0.24	5	3	.5-2
	7-27	4-17	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	0-0	Low-------	0.24			
	27-44	14-18	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	0-0	Low-------	0.32			
	44-80	10-25	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	0-0	Low-------	0.32			

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
BeA--------------	0-10	4-15	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	0-0	Low-------	0.24	5	3	.5-2
Besner	10-18	4-17	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	0-0	Low-------	0.24			
	18-30	14-18	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	0-0	Low-------	0.32			
	30-80	10-25	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	0-0	Low-------	0.32			
BtC--------------	0-10	2-10	1.20-1.50	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.17	5	2	.5-2
Betis	10-40	2-10	1.20-1.50	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.17			
	40-83	5-15	1.20-1.50	6.0-20	0.08-0.11	4.5-6.0	<2	Low-------	0.17			
BwB--------------	0-13	3-15	1.40-1.69	2.0-6.0	0.10-0.15	4.5-6.5	<2	Low-------	0.32	5	3	.5-1
Bowie	13-38	18-30	1.60-1.69	0.6-2.0	0.10-0.16	4.5-5.5	<2	Low-------	0.32			
	38-72	18-35	1.60-1.80	0.2-0.6	0.10-0.16	4.5-5.5	<2	Low-------	0.32			
	72-93	25-40	1.65-1.80	0.2-0.6	0.10-0.16	4.5-5.5	<2	Moderate	0.32			
ChA--------------	0-12	15-30	1.30-1.50	0.2-0.6	0.15-0.20	5.6-7.3	0-2	Moderate	0.32	5	4	1-3
Chireno	12-80	35-42	1.40-1.60	0.2-0.6	0.10-0.16	6.1-7.8	0-2	High------	0.32			
CtE--------------	0-9	2-15	1.20-1.40	2.0-6.0	0.09-0.12	4.5-5.5	<2	Low-------	0.37	3	3	.5-2
Cuthbert	9-23	35-60	1.24-1.45	0.2-0.6	0.10-0.15	3.6-5.5	<2	Moderate	0.32			
	23-35	20-50	1.35-1.60	0.2-0.6	0.08-0.14	3.6-5.5	<2	Moderate	0.32			
	35-62	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32			
CtG--------------	0-9	2-15	1.20-1.40	2.0-6.0	0.09-0.12	4.5-5.5	<2	Low-------	0.37	3	3	.5-2
Cuthbert	9-28	35-60	1.24-1.45	0.2-0.6	0.10-0.15	3.6-5.5	<2	Moderate	0.32			
	28-60	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32			
CuE--------------	0-5	2-15	1.20-1.40	2.0-6.0	0.07-0.11	4.5-5.5	<2	Low-------	0.20	3	8	.5-2
Cuthbert	5-35	35-60	1.24-1.45	0.2-0.6	0.10-0.15	3.6-5.5	<2	Moderate	0.32			
	35-60	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32			
DaC--------------	0-12	3-15	1.35-1.55	6.0-20	0.05-0.10	4.5-6.5	0-0	Low-------	0.17	5	2	.5-1
Darco	12-47	3-15	1.60-1.85	6.0-20	0.05-0.10	4.5-6.5	0-0	Low-------	0.17			
	47-68	12-35	1.40-1.65	0.6-2.0	0.10-0.15	4.5-5.5	0-0	Low-------	0.24			
	68-82	12-35	1.40-1.65	0.6-2.0	0.10-0.15	4.5-5.5	0-0	Low-------	0.24			
DaE--------------	0-12	3-15	1.35-1.55	6.0-20	0.05-0.10	4.5-6.5	0-0	Low-------	0.17	5	2	.5-1
Darco	12-49	3-15	1.60-1.85	6.0-20	0.05-0.10	4.5-6.5	0-0	Low-------	0.17			
	49-80	12-35	1.40-1.65	0.6-2.0	0.10-0.15	4.5-5.5	0-0	Low-------	0.24			
EaA--------------	0-6	40-60	1.25-1.45	<0.06	0.12-0.18	5.6-7.8	0-2	High------	0.32	5	4	1-3
Eastham	6-56	45-60	1.30-1.50	<0.06	0.12-0.18	5.1-8.4	0-2	High------	0.32			
	56-80	40-60	1.35-1.55	<0.06	0.12-0.18	6.6-8.4	0-4	High------	0.32			
EaB--------------	0-4	40-60	1.25-1.45	<0.06	0.12-0.18	5.6-7.8	0-2	High------	0.32	5	4	1-3
Eastham	4-40	45-60	1.30-1.50	<0.06	0.12-0.18	5.1-8.4	0-2	High------	0.32			
	40-88	40-60	1.35-1.55	<0.06	0.12-0.18	6.6-8.4	0-4	High------	0.32			
ErB--------------	0-12	2-15	1.25-1.40	2.0-6.0	0.11-0.15	3.6-6.5	0-2	Low-------	0.28	5	3	.5-2
Elrose	12-42	25-35	1.30-1.55	0.6-2.0	0.13-0.17	4.5-6.5	0-2	Low-------	0.32			
	42-80	9-55	1.35-1.65	0.6-2.0	0.11-0.16	4.5-6.5	0-2	Moderate	0.32			
EtB--------------	0-4	10-25	1.35-1.55	0.6-2.0	0.12-0.17	5.1-7.3	0-0	Low-------	0.43	4	5	.3-2
Etoile	4-9	40-60	1.35-1.50	<0.06	0.12-0.18	5.1-7.3	0-0	High------	0.32			
	9-39	40-60	1.35-1.50	<0.06	0.12-0.18	5.1-7.3	0-0	High------	0.32			
	39-47	40-60	1.35-1.50	<0.06	0.12-0.18	6.6-8.4	0-0	High------	0.32	4	5	.3-2
	47-80	40-60	1.35-1.60	<0.06	0.12-0.18	6.6-8.4	0-2	High------	0.32			
FrB--------------	0-11	5-15	1.35-1.56	2.0-6.0	0.11-0.15	5.1-7.3	0-2	Low-------	0.32	5	3	.5-2
Freestone	11-40	20-35	1.35-1.55	0.2-0.6	0.12-0.17	4.5-6.0	0-2	Moderate	0.32			
	40-81	30-50	1.29-1.60	0.06-0.2	0.12-0.18	4.5-6.0	0-2	High------	0.32			

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
FsA*:												
Freestone-------	0-21	5-15	1.35-1.56	2.0-6.0	0.11-0.15	5.1-7.3	0-2	Low-------	0.32	5	3	.5-2
	21-32	20-35	1.35-1.55	0.2-0.6	0.12-0.17	4.5-6.0	0-2	Moderate	0.32			
	32-85	30-50	1.29-1.60	0.06-0.2	0.12-0.18	4.5-6.0	0-2	High------	0.32			
Derly-----------	0-12	8-20	1.40-1.60	0.6-2.0	0.11-0.16	4.5-6.5	0-2	Low-------	0.37	5	5	.5-2
	12-23	30-45	1.35-1.55	0.06-0.2	0.13-0.18	4.5-6.0	0-2	Moderate	0.37			
	23-64	35-50	1.25-1.50	<0.06	0.13-0.18	4.5-6.0	0-4	High------	0.32			
	64-80	20-45	1.30-1.55	<0.06	0.13-0.18	5.1-7.3	0-4	High------	0.32			
FuA-------------- Fuller	0-4	3-15	1.20-1.35	0.6-2.0	0.12-0.18	4.5-6.0	0-2	Low-------	0.49	3	3	1-3
	4-26	3-15	1.40-1.65	0.6-2.0	0.10-0.17	3.6-6.5	0-2	Low-------	0.49			
	26-44	18-35	1.30-1.55	<0.06	0.11-0.20	6.1-8.4	1-4	High------	0.37			
	44-66	20-50	1.20-1.45	<0.06	0.12-0.20	6.1-8.4	1-4	High------	0.37			
FuB-------------- Fuller	0-7	3-15	1.20-1.35	0.6-2.0	0.12-0.18	4.5-6.0	0-2	Low-------	0.49	3	3	1-3
	7-27	3-15	1.40-1.65	0.6-2.0	0.10-0.17	3.6-6.5	0-2	Low-------	0.49			
	27-51	18-35	1.30-1.55	<0.06	0.11-0.20	6.1-8.4	1-4	High------	0.37			
	51-65	20-50	1.20-1.45	<0.06	0.12-0.20	6.1-8.4	1-4	High------	0.37			
GaA-------------- Garner	0-7	40-55	1.20-1.45	0.06-0.2	0.12-0.17	5.6-7.8	0-0	High------	0.32	5	4	1-4
	7-45	50-60	1.30-1.50	<0.06	0.12-0.17	5.6-7.3	0-4	High------	0.32			
	45-80	50-60	1.30-1.50	<0.06	0.12-0.17	5.6-8.4	0-4	High------	0.32			
GrB-------------- Grapeland	0-12	1-4	1.35-1.50	6.0-20	0.04-0.07	4.5-6.5	<2	Low-------	0.17	5	1	<2
	12-80	6-12	1.35-1.65	6.0-20	0.05-0.12	3.6-6.5	<2	Low-------	0.20			
HaA-------------- Hainesville	0-14	1-4	1.50-1.70	6.0-20	0.04-0.07	5.1-6.5	<2	Low-------	0.17	5	1	<2
	14-80	2-10	1.50-1.70	6.0-20	0.04-0.10	3.6-6.5	<2	Low-------	0.20			
HbC-------------- Hallsbluff	0-6	35-45	1.25-1.45	<0.06	0.12-0.17	7.4-8.4	0-0	High------	0.32	5	4	1-3
	6-17	45-60	1.30-1.45	<0.06	0.12-0.17	7.4-8.4	0-0	High------	0.32			
	17-29	45-60	1.30-1.45	<0.06	0.12-0.17	7.4-8.4	0-2	High------	0.32			
	29-80	45-65	1.35-1.50	<0.06	0.12-0.17	7.9-8.4	0-4	High------	0.32			
Hc--------------- Hannahatchee	0-23	10-20	1.30-1.65	2.0-6.0	0.10-0.15	5.1-6.5	<2	Low-------	0.32	5	3	.5-2
	23-39	18-28	1.40-1.60	0.6-2.0	0.12-0.17	4.5-7.3	<2	Low-------	0.32			.5-1
	39-76	18-35	1.40-1.55	0.6-2.0	0.12-0.17	4.5-7.3	<2	Low-------	0.32			.5-1
HeA-------------- Herty	0-8	6-15	1.20-1.40	0.6-2.0	0.12-0.18	4.5-6.0	0-2	Low-------	0.43	5	3	.5-2
	8-18	35-45	1.40-1.60	0.06-0.2	0.12-0.18	3.6-5.5	0-4	High------	0.37			
	18-47	40-70	1.20-1.50	<0.06	0.12-0.18	3.6-6.0	2-8	High------	0.37			
	47-80	35-70	1.15-1.35	<0.06	0.10-0.16	3.6-6.5	4-8	High------	0.37			
HeB-------------- Herty	0-10	6-15	1.20-1.40	0.6-2.0	0.12-0.18	4.5-6.0	0-2	Low-------	0.43	5	3	.5-2
	10-24	35-45	1.40-1.60	0.06-0.2	0.12-0.18	3.6-5.5	0-4	High------	0.37			
	24-45	40-70	1.20-1.50	<0.06	0.12-0.18	4.5-5.5	2-8	High------	0.37			
	45-80	35-70	1.15-1.35	<0.06	0.10-0.16	4.5-5.5	4-8	High------	0.37			
Iu--------------- Iulus	0-7	6-15	1.20-1.40	0.6-2.0	0.11-0.18	4.5-6.0	0-2	Low-------	0.37	5	5	.5-2
	7-27	6-20	1.26-1.45	0.6-2.0	0.11-0.18	4.5-6.0	0-2	Low-------	0.32			
	27-82	10-28	1.30-1.50	0.6-2.0	0.11-0.18	4.5-6.0	0-2	Low-------	0.32			
Ka--------------- Kaufman	0-3	50-86	1.20-1.45	<0.06	0.12-0.18	5.6-8.4	<2	Very high	0.32	5	4	1-4
	3-62	60-86	1.25-1.45	<0.06	0.12-0.18	5.6-8.4	<2	Very high	0.32			
	62-90	60-86	1.25-1.45	<0.06	0.12-0.18	5.6-8.4	<2	Very high	0.32			
Kb--------------- Kaufman	0-7	50-86	1.20-1.45	<0.06	0.12-0.18	5.6-8.4	0-2	Very high	0.32	5	4	1-4
	7-62	60-86	1.25-1.45	<0.06	0.12-0.18	5.6-8.4	0-2	Very high	0.32			
	62-80	60-86	1.25-1.45	<0.06	0.12-0.18	5.6-8.4	0-2	Very high	0.32			

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
KcE	0-3	8-12	1.20-1.40	0.6-2.0	0.11-0.15	4.5-6.0	0-2	Low	0.49	5	3	1-4
Kellison	3-7	8-12	1.20-1.40	0.6-2.0	0.11-0.15	4.5-6.0	0-2	Low	0.49			
	7-22	45-60	1.35-1.55	<0.06	0.12-0.17	3.6-5.5	0-4	High	0.37			
	22-47	45-70	1.40-1.60	<0.06	0.12-0.17	3.6-5.5	2-8	High	0.37			
	47-65	35-70	1.45-1.65	<0.06	0.08-0.12	4.5-7.3	2-8	High	0.37			
KeB	0-6	4-8	1.30-1.50	0.6-2.0	0.10-0.18	5.1-6.5	0-0	Low	0.37	4	3	.5-2
Keltys	6-18	4-8	1.35-1.60	0.6-2.0	0.10-0.18	5.1-6.0	0-0	Low	0.32			
	18-57	8-18	1.40-1.65	0.06-0.2	0.11-0.18	4.5-5.5	0-2	Low	0.32			
	57-80	25-45	1.50-1.70	<0.06	0.06-0.10	3.6-5.5	0-4	Low	0.32			
KeD	0-8	4-8	1.30-1.50	0.6-2.0	0.10-0.18	5.1-6.5	0-0	Low	0.37	4	3	.5-2
Keltys	8-17	4-8	1.35-1.60	0.6-2.0	0.10-0.18	5.1-6.0	0-0	Low	0.32			
	17-53	8-18	1.40-1.65	0.06-0.2	0.11-0.18	4.5-5.5	0-2	Low	0.32			
	53-80	25-45	1.50-1.70	<0.06	0.06-0.10	3.6-5.5	0-4	Low	0.32			
KfC	0-11	2-15	1.20-1.40	2.0-6.0	0.09-0.12	5.1-7.3	<2	Low	0.37	4	3	.5-2
Kirvin	11-46	35-60	1.24-1.45	0.2-0.6	0.11-0.15	3.6-5.6	<2	Moderate	0.32			
	46-56	25-50	1.35-1.60	0.2-0.6	0.11-0.15	3.6-5.0	<2	Moderate	0.32			
	56-74	20-45	1.40-1.65	0.2-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32			
KgC	0-11	2-15	1.20-1.40	2.0-6.0	0.07-0.11	5.1-7.3	<2	Low	0.20	4	8	.5-2
Kirvin	11-38	35-60	1.24-1.45	0.2-0.6	0.11-0.15	3.6-5.6	<2	Moderate	0.32			
	38-48	25-50	1.35-1.60	0.2-0.6	0.11-0.15	3.6-5.0	<2	Moderate	0.32			
	48-60	20-45	1.40-1.65	0.2-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32			
KhC	0-4	20-40	1.20-1.40	0.2-0.6	0.12-0.15	4.5-7.3	<2	Moderate	0.32	4	4	.5-1
Kirvin	4-36	35-60	1.30-1.45	0.2-0.6	0.11-0.15	3.6-5.5	<2	Moderate	0.32			
	36-45	25-50	1.30-1.50	0.2-0.6	0.11-0.15	3.6-5.0	<2	Moderate	0.32			
	45-70	20-45	1.40-1.60	0.06-0.2	0.08-0.14	3.6-5.0	<2	Moderate	0.32			
Ko	0-15	20-35	1.25-1.50	0.2-0.6	0.12-0.18	6.1-7.8	0-0	Moderate	0.32	5	5	1-3
Kosse	15-44	20-35	1.30-1.60	0.2-0.6	0.12-0.18	6.1-7.8	0-2	Moderate	0.32			
	44-80	14-24	1.40-1.65	0.6-2.0	0.11-0.18	6.6-8.4	0-2	Low	0.32			
Kp	0-9	6-17	1.40-1.60	0.2-0.6	0.12-0.18	3.6-6.0	0-2	Low	0.49	5	6	.5-1
Koury	9-54	8-18	1.45-1.65	0.2-0.6	0.12-0.18	3.6-6.0	0-2	Low	0.49			
	54-80	6-35	1.45-1.65	0.2-0.6	0.12-0.20	3.6-6.0	1-4	Low	0.49			
KuB	0-6	3-10	1.30-1.50	0.6-2.0	0.10-0.16	5.1-6.5	0-0	Low	0.28	4	3	.5-2
Kurth	6-20	3-10	1.40-1.55	0.6-2.0	0.10-0.15	5.1-6.0	0-0	Low	0.28			
	20-28	18-30	1.50-1.70	0.6-2.0	0.11-0.18	5.1-6.0	0-0	Low	0.32			
	28-40	25-35	1.50-1.65	0.2-0.6	0.12-0.18	5.1-6.0	0-2	Low	0.32			
	40-80	15-30	1.60-1.70	0.06-0.2	0.10-0.15	3.6-5.5	0-2	Low	0.32			
KuD	0-6	3-10	1.30-1.50	0.6-2.0	0.10-0.16	5.1-6.5	0-0	Low	0.28	4	3	.5-2
Kurth	6-22	3-10	1.40-1.55	0.6-2.0	0.10-0.15	5.1-6.0	0-0	Low	0.28			
	22-29	18-30	1.50-1.70	0.6-2.0	0.11-0.18	5.1-6.0	0-0	Low	0.32			
	29-40	25-35	1.50-1.65	0.2-0.6	0.12-0.18	5.1-6.0	0-2	Low	0.32			
	40-80	15-30	1.60-1.70	0.06-0.2	0.10-0.15	3.6-5.5	0-2	Low	0.32			
LaA	0-4	30-40	1.30-1.40	0.06-0.2	0.14-0.20	5.1-6.0	0-2	High	0.32	5	4	.1-1
LaCerda	4-47	60-70	1.40-1.50	<0.06	0.12-0.18	4.5-7.3	0-2	High	0.32			
	47-80	60-70	1.45-1.55	<0.06	0.12-0.18	6.6-8.4	0-2	High	0.32			
LaB	0-4	30-40	1.30-1.40	0.06-0.2	0.14-0.20	5.1-6.0	0-2	High	0.32	5	4	.1-1
LaCerda	4-49	60-70	1.40-1.50	<0.06	0.12-0.18	4.5-7.3	0-2	High	0.32			
	49-80	35-70	1.45-1.55	<0.06	0.12-0.18	6.6-8.4	0-2	High	0.32			

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
LaE-------------- LaCerda	0-3	30-40	1.30-1.40	0.06-0.2	0.14-0.20	5.1-6.0	0-2	High------	0.32	5	4	.1-1
	3-43	60-70	1.40-1.50	<0.06	0.12-0.18	4.5-7.3	0-2	High------	0.32			
	43-80	35-70	1.45-1.55	<0.06	0.12-0.18	6.6-8.4	0-2	High------	0.32			
Lc--------------- Laneville	0-12	10-26	1.25-1.35	0.6-2.0	0.11-0.16	5.1-6.5	<2	Low-------	0.37	5	5	1-3
	12-34	18-35	1.30-1.45	0.2-0.6	0.12-0.18	4.5-5.5	0-2	Moderate	0.32			
	34-87	35-45	1.40-1.55	0.06-0.2	0.12-0.18	4.5-6.0	0-4	High------	0.32			
LeB-------------- Latex	0-4	2-18	1.28-1.45	2.0-6.0	0.11-0.16	4.5-6.0	<2	Low-------	0.37	5	3	.5-2
	4-35	18-35	1.28-1.45	0.6-2.0	0.11-0.18	4.5-5.5	<2	Moderate	0.32			
	35-80	35-55	1.30-1.65	0.06-0.2	0.12-0.17	4.5-5.0	<2	High------	0.32			
LtC-------------- Lilbert	0-5	3-15	1.50-1.60	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.20	5	2	.5-2
	5-27	3-15	1.50-1.65	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.20			
	27-38	18-30	1.55-1.69	0.6-2.0	0.10-0.15	4.5-6.0	<2	Low-------	0.24			
	38-80	18-38	1.60-1.75	0.2-0.6	0.10-0.15	4.5-6.0	<2	Low-------	0.24			
LvC-------------- Lovelady	0-11	2-8	1.35-1.50	6.0-20	0.05-0.10	4.5-6.5	<2	Low-------	0.20	5	2	.5-2
	11-26	2-8	1.35-1.55	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.20			
	26-62	18-30	1.30-1.45	0.6-2.0	0.10-0.15	4.5-6.0	<2	Low-------	0.32			
	62-76	18-40	1.35-1.65	0.2-0.6	0.13-0.17	3.6-5.5	<2	Moderate	0.32			
	76-80	15-40	1.35-1.65	0.2-0.6	0.13-0.17	3.6-5.5	<2	Moderate	0.32			
LvD-------------- Lovelady	0-4	2-8	1.35-1.50	6.0-20	0.05-0.10	4.5-6.5	<2	Low-------	0.20	5	2	.5-2
	4-24	2-8	1.35-1.55	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.20			
	24-41	18-35	1.30-1.45	0.6-2.0	0.10-0.15	4.5-6.0	<2	Low-------	0.32			
	41-67	18-40	1.35-1.65	0.2-0.6	0.13-0.17	3.6-5.5	<2	Moderate	0.32			
	67-81	15-40	1.35-1.65	0.2-0.6	0.13-0.17	3.6-5.5	<2	Moderate	0.32			
MoA-------------- Mollville	0-10	16-20	1.40-1.65	0.2-0.6	0.15-0.20	4.5-6.0	<2	Low-------	0.37	5	5	.5-1
	10-63	20-35	1.50-1.69	0.06-0.2	0.12-0.17	4.5-6.0	<4	Moderate	0.32			
	63-84	15-35	1.50-1.69	0.06-0.2	0.15-0.20	5.1-7.8	<4	Moderate	0.32			
MpA*:												
Mollville-------	0-14	16-20	1.40-1.65	0.2-0.6	0.15-0.20	4.5-6.0	<2	Low-------	0.37	5	5	.5-1
	14-44	20-35	1.50-1.69	0.06-0.2	0.12-0.17	4.5-6.0	<4	Moderate	0.32			
	44-52	15-35	1.50-1.69	0.06-0.2	0.15-0.20	4.5-6.0	<4	Moderate	0.32			
	52-80	3-12	1.50-1.65	2.0-6.0	0.07-0.11	5.1-7.8	<4	Low-------	0.20			
Besner----------	0-5	4-15	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	0-0	Low-------	0.24	5	3	.5-2
	5-36	4-17	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	0-0	Low-------	0.24			
	36-61	14-18	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	0-0	Low-------	0.32			
	61-80	10-25	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	0-0	Low-------	0.32			
MsB-------------- Moswell	0-6	5-15	1.25-1.40	0.6-2.0	0.13-0.18	4.5-6.0	0-2	Low-------	0.49	5	5	.5-1
	6-17	60-70	1.20-1.40	<0.06	0.12-0.18	3.6-5.5	0-2	High------	0.32			
	17-46	60-70	1.20-1.40	<0.06	0.12-0.18	3.6-5.0	2-8	High------	0.32			
	46-80	35-75	1.20-1.40	<0.06	0.10-0.15	3.6-5.5	2-8	High------	0.32			
MsE-------------- Moswell	0-6	5-15	1.25-1.40	0.6-2.0	0.13-0.18	4.5-6.0	0-2	Low-------	0.49	5	5	.5-1
	6-22	60-70	1.20-1.40	<0.06	0.12-0.18	3.6-5.5	0-2	High------	0.32			
	22-47	60-70	1.20-1.40	<0.06	0.12-0.18	3.6-5.0	2-8	High------	0.32			
	47-80	35-75	1.20-1.40	<0.06	0.10-0.15	3.6-5.5	2-8	High------	0.32			
MxA*:												
Moten-----------	0-4	6-12	1.40-1.65	0.6-2.0	0.11-0.15	4.5-6.0	0-2	Low-------	0.37	5	3	1-3
	4-23	6-12	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.0	0-2	Low-------	0.37			
	23-38	12-18	1.40-1.65	0.2-0.6	0.13-0.20	4.5-7.3	1-4	Low-------	0.37			
	38-64	15-35	1.30-1.60	0.06-0.2	0.12-0.18	4.5-7.3	1-4	Low-------	0.32			
	64-80	15-40	1.30-1.60	0.06-0.2	0.12-0.20	6.1-7.8	1-4	Moderate	0.32			

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
MxA*:												
Multey	0-5	4-10	1.30-1.50	0.6-2.0	0.11-0.15	5.1-6.5	0-0	Low	0.32	5	3	1-3
	5-22	4-10	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	0-0	Low	0.32			
	22-39	10-18	1.40-1.60	0.6-2.0	0.13-0.17	4.5-6.0	0-0	Low	0.32			
	39-57	12-25	1.40-1.60	0.6-2.0	0.13-0.17	4.5-6.0	0-4	Low	0.28			
	57-80	8-35	1.40-1.65	0.6-6.0	0.10-0.17	4.5-8.4	1-4	Low	0.28			
NaG Naclina	0-3	30-40	1.30-1.40	0.06-0.2	0.1-0.18	5.1-7.3	0-2	High	0.32	4	4	.5-2
	3-41	40-60	1.40-1.50	<0.06	0.12-0.18	5.1-8.4	0-2	High	0.32			
	41-80	40-60	1.40-1.55	<0.06	0.12-0.18	7.4-8.4	0-2	High	0.32			
Nc Naconiche	0-8	6-12	1.20-1.35	0.6-2.0	0.10-0.15	3.6-5.5	<2	Low	0.24	5	3	4-15
	8-25	2-12	1.20-1.45	2.0-6.0	0.08-0.15	3.6-5.5	<2	Low	0.20			
	25-80	2-12	1.20-1.55	2.0-6.0	0.07-0.15	3.6-5.5	<2	Low	0.20			
Nh Nahatche	0-9	18-35	1.10-1.30	0.6-2.0	0.13-0.20	5.6-7.8	0-2	Moderate	0.28	5	6	1-3
	9-54	18-35	1.20-1.50	0.6-2.0	0.12-0.20	5.6-7.8	0-2	Moderate	0.28			
	54-80	18-35	1.30-1.60	0.6-2.0	0.12-0.18	5.6-7.8	0-2	Moderate	0.28			
Oz*:												
Ozias	0-5	30-40	1.20-1.40	0.06-0.2	0.12-0.18	3.6-5.0	0-8	High	0.32	5	5	1-4
	5-63	35-60	1.25-1.50	<0.06	0.12-0.16	3.6-7.8	0-16	High	0.32			
	63-80	35-60	1.25-1.50	<0.06	0.12-0.16	3.6-7.8	2-16	High	0.32			
Pophers	0-18	20-40	1.30-1.50	0.2-0.6	0.14-0.20	3.6-5.5	<4	Moderate	0.49	5	7	<2
	18-30	20-35	1.35-1.60	0.2-0.6	0.12-0.18	3.6-5.5	<8	Moderate	0.49			
	30-80	27-45	1.40-1.65	0.06-0.2	0.10-0.15	3.6-5.5	4-16	Moderate	0.49			
PeB Penning	0-4	8-15	1.30-1.45	2.0-6.0	0.10-0.15	4.5-6.0	<2	Low	0.37	4	5	.5-2
	4-19	8-15	1.30-1.50	2.0-6.0	0.10-0.15	4.5-6.0	<2	Low	0.37			
	19-38	18-25	1.35-1.55	0.6-2.0	0.13-0.17	4.5-6.5	0-2	Low	0.32			
	38-56	18-26	1.40-1.65	0.6-2.0	0.13-0.17	4.5-6.5	0-4	Moderate	0.32			
	56-70	30-50	1.40-1.69	<0.06	0.08-0.12	4.5-7.3	2-8	High	0.32			
PnA Percilla	0-4	20-35	1.40-1.50	0.2-0.6	0.15-0.18	4.5-6.5	0-2	Low	0.37	5	6	.1-1
	4-83	35-50	1.50-1.60	<0.06	0.12-0.18	4.5-7.3	0-2	Moderate	0.32			
Po Pophers	0-16	15-26	1.30-1.50	0.2-0.6	0.14-0.20	3.6-6.0	<4	Moderate	0.32	5	6	<2
	16-30	20-35	1.35-1.60	0.2-0.6	0.12-0.18	3.6-5.5	<8	Moderate	0.49			
	30-82	27-45	1.40-1.65	0.06-0.2	0.10-0.15	3.6-5.5	4-16	Moderate	0.49			
PsA Portersprings	0-16	10-18	1.25-1.35	0.6-2.0	0.11-0.18	4.5-7.3	0-0	Low	0.28	5	5	1-3
	16-42	20-35	1.30-1.45	0.6-2.0	0.12-0.18	4.5-7.8	0-0	Moderate	0.32			
	42-72	8-15	1.35-1.55	0.6-2.0	0.09-0.16	5.6-7.8	0-0	Low	0.28			
	72-87	1-7	1.40-1.65	2.0-6.0	0.06-0.10	5.6-7.8	0-0	Low	0.20			
RnB Rentzel	0-6	5-10	1.25-1.35	6.0-20	0.05-0.10	5.1-6.5	<2	Low	0.17	5	2	.1-2
	6-26	5-10	1.30-1.55	6.0-20	0.05-0.10	5.1-6.5	<2	Low	0.17			
	26-80	15-35	1.40-1.75	0.2-0.6	0.10-0.1	3.6-5.5	<2	Low	0.32			
SaB Sacul	0-8	5-20	1.30-1.50	0.6-2.0	0.09-0.12	4.5-6.0	---	Low	0.28	5	3	1-3
	8-16	2-25	1.40-1.60	0.6-2.0	0.07-0.17	4.5-6.0	---	Low	0.28			
	16-48	35-60	1.25-1.40	0.06-0.2	0.15-0.18	3.6-6.5	---	High	0.32			
	48-85	15-40	1.30-1.45	0.2-0.6	0.14-0.18	3.6-6.0	---	Low	0.28			
SwA*:												
Sawlit	0-7	6-18	1.35-1.50	2.0-6.0	0.11-0.16	4.5-6.0	0-0	Low	0.37	5	5	.5-2
	7-22	25-35	1.35-1.50	0.6-2.0	0.13-0.18	4.5-6.0	0-0	Low	0.37			
	22-33	20-35	1.30-1.55	0.6-2.0	0.13-0.18	4.5-6.0	0-0	Moderate	0.32			
	33-80	35-50	1.20-1.45	<0.06	0.12-0.17	3.6-5.5	0-0	High	0.32			

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
SwA*:												
Latex	0-6	2-18	1.28-1.45	2.0-6.0	0.11-0.16	4.5-6.0	<2	Low	0.37	5	3	.5-2
	6-20	18-35	1.28-1.45	0.6-2.0	0.11-0.18	4.5-5.5	<2	Moderate	0.32			
	20-61	18-35	1.30-1.45	0.6-2.0	0.13-0.18	4.5-5.5	<2	Moderate	0.32			
	61-80	35-55	1.30-1.65	0.06-0.2	0.12-0.17	4.5-5.0	<2	High	0.32			
TaE: Tenaha	0-4	3-15	1.50-1.65	6.0-20	0.05-0.10	5.1-6.5	0-0	Low	0.17	3	2	.5-1
	4-23	3-15	1.50-1.65	6.0-20	0.05-0.10	5.1-6.5	0-0	Low	0.24			
	23-58	18-35	1.50-1.65	0.6-2.0	0.10-0.15	4.5-5.5	0-0	Low	0.24			
	58-80	18-40	1.60-1.75	0.2-0.6	0.08-0.14	4.5-5.5	0-0	Low	0.24			
Te: Texark	0-16	45-75	1.30-1.40	<0.06	0.15-0.18	6.1-7.8	0-2	High	0.32	5	4	1-4
	16-56	60-80	1.35-1.45	<0.06	0.12-0.18	4.5-7.3	0-4	High	0.32			
	56-80	50-80	1.35-1.45	<0.06	0.12-0.18	4.5-8.4	0-4	High	0.32			
Tf: Texark	0-13	45-75	1.30-1.40	<0.06	0.15-0.18	6.1-7.8	<2	High	0.32	5	4	1-4
	13-52	60-80	1.35-1.45	<0.06	0.12-0.18	4.5-7.3	0-4	High	0.32			
	52-80	50-80	1.35-1.45	<0.06	0.12-0.18	4.5-8.4	0-4	High	0.32			
ToC: Tonkawa	0-6	2-8	1.30-1.55	6.0-20	0.04-0.07	3.6-6.0	<2	Low	0.15	5	1	<2
	6-82	2-8	1.30-1.55	6.0-20	0.04-0.07	3.6-6.0	<2	Low	0.15			
TrE: Trawick	0-4	10-20	1.25-1.45	0.6-2.0	0.11-0.15	5.6-7.3	0-0	Low	0.32	2	3	.5-2
	4-39	35-50	1.30-1.50	0.2-0.6	0.10-0.17	5.1-7.3	0-0	Moderate	0.32			
	39-43	---	---	0.2-2.0	---	4.5-6.0	---	----------	----			
TwC: Trawick	0-10	10-35	1.30-1.50	0.6-2.0	0.07-0.15	5.6-7.3	0-0	Low	0.20	2	8	.5-2
	10-38	35-55	1.30-1.50	0.2-0.6	0.10-0.17	5.1-7.3	0-0	Moderate	0.32			
	38-48	---	---	0.2-2.0	---	4.5-6.0	---	----------	----			
TwE: Trawick	0-4	10-20	1.30-1.50	0.6-2.0	0.07-0.15	5.6-7.3	0-0	Low	0.20	2	8	.5-2
	4-38	35-55	1.30-1.50	0.2-0.6	0.10-0.17	5.1-7.3	0-0	Moderate	0.32			
	38-56	---	---	0.2-2.0	---	4.5-6.0	---	----------	----			
TxG*:												
Trawick	0-4	10-20	1.30-1.50	0.6-2.0	0.07-0.15	5.6-7.3	0-0	Low	0.20	2	8	.5-2
	4-38	35-55	1.30-1.50	0.2-0.6	0.10-0.17	5.1-7.3	0-0	Moderate	0.32			
	38-60	---	---	0.2-2.0	---	4.5-6.0	---	----------	----			
Bub	0-6	27-40	1.25-1.45	0.2-0.6	0.07-0.15	5.6-6.5	0-2	Low	0.20	1	8	.5-2
	6-19	40-55	1.40-1.60	0.2-0.6	0.06-0.11	4.5-6.5	0-2	Moderate	0.32			
	19-30	---	---	0.00-0.06	---	5.6-8.4	---	----------	----			
WnB: Woden	0-12	5-15	1.25-1.40	2.0-6.0	0.11-0.16	5.1-7.3	<2	Low	0.20	5	3	.5-2
	12-80	8-18	1.35-1.60	2.0-6.0	0.12-0.18	5.1-6.5	<2	Low	0.20			
WoB: Woodtell	0-5	5-20	1.30-1.55	0.6-2.0	0.11-0.15	4.5-6.5	<2	Low	0.43	4	3	1-2
	5-25	40-60	1.25-1.40	<0.06	0.12-0.17	4.5-5.5	<2	High	0.32			
	25-56	30-50	1.25-1.50	0.06-0.2	0.12-0.17	4.5-6.0	<2	High	0.32			
	56-80	30-50	1.25-1.50	0.06-0.2	0.08-0.14	4.5-7.3	<2	High	0.32			
WoE: Woodtell	0-6	5-20	1.30-1.55	0.6-2.0	0.11-0.15	4.5-6.5	<2	Low	0.43	4	3	1-2
	6-29	40-60	1.25-1.40	<0.06	0.12-0.17	4.5-5.5	<2	High	0.32			
	29-48	30-50	1.25-1.50	0.06-0.2	0.12-0.17	4.5-6.0	<2	High	0.32			
	48-80	30-50	1.25-1.50	0.06-0.2	0.08-0.14	4.5-7.3	<2	High	0.32			

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.--Soil and Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
AaB: Alazan	C	None	---	---	1.5-3.5	Apparent	Jan-Apr	>60	---	High	Moderate.
AbA*:											
Alazan	C	None	---	---	1.5-3.5	Apparent	Jan-Apr	>60	---	High	Moderate.
Besner	B	None	---	---	4.0-6.0	Apparent	Jan-Feb	>60	---	Low	Moderate.
AfB: Alto	C	None	---	---	2.5-4.0	Apparent	Jan-Mar	>60	---	High	Moderate.
AnA*, AnB: Annona	D	None	---	---	>6.0	---	---	>60	---	High	Moderate.
AtB: Attoyac	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
AuB, AuD: Austonio	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
BaB: Bernaldo	B	None	---	---	4.0-6.0	Perched	Nov-Feb	>60	---	Moderate	Moderate.
BbA*:											
Bernaldo	B	None	---	---	4.0-6.0	Perched	Nov-Feb	>60	---	Moderate	Moderate.
Besner	B	None	---	---	4.0-6.0	Apparent	Jan-Feb	>60	---	Low	Moderate.
BeA: Besner	B	None	---	---	4.0-6.0	Apparent	Jan-Feb	>60	---	Low	Moderate.
BtC: Betis	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
BwB: Bowie	B	None	---	---	3.5-5.0	Perched	Jan-Apr	>60	---	Moderate	High.
ChA: Chireno	D	None	---	---	3.5-5.0	Apparent	Jan-Apr	>60	---	High	Low.
CtE, CtG, CuE: Cuthbert	C	None	---	---	>6.0	---	---	>60	---	High	High.
DaC, DaE: Darco	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
EaA, EaB: Eastham	D	None	---	---	>6.0	---	---	>60	---	High	Low.
ErB: Elrose	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
EtB: Etoile	D	None	---	---	>6.0	---	---	>60	---	High	Moderate.

See footnote at end of table.

Table 16.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
FrB---------------- Freestone	C	None---------	---	---	2.0-3.5	Perched	Dec-May	>60	---	High-----	Moderate.
FsA*:											
Freestone---------	C	None---------	---	---	2.0-3.5	Perched	Dec-May	>60	---	High-----	Moderate.
Derly-------------	D	None---------	---	---	+.5-1.0	Perched	Oct-May	>60	---	High-----	High.
FuA, FuB---------- Fuller	D	None---------	---	---	0.5-1.5	Perched	Jan-May	>60	---	High-----	High.
GaA--------------- Garner	D	None---------	---	---	>6.0	---	---	>60	---	High-----	Low.
GrB--------------- Grapeland	A	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
HaA--------------- Hainesville	A	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
HbC--------------- Hallsbluff	D	None---------	---	---	>6.0	---	---	>60	---	High-----	Low.
Hc---------------- Hannahatchee	B	Frequent----	Brief-----	Mar-May	>6.0	---	---	>60	---	Moderate	Moderate.
HeA, HeB---------- Herty	D	None---------	---	---	0-1.0	Perched	Jan-Apr	>60	---	High-----	High.
Iu---------------- Iulus	B	Frequent----	Brief-----	Dec-Apr	1.5-4.0	Perched	Dec-Apr	>60	---	Moderate	High.
Ka---------------- Kaufman	D	Occasional	Brief-----	Feb-May	1.5-3.5	Apparent	Nov-Apr	>60	---	High-----	Low.
Kb---------------- Kaufman	D	Frequent----	Very brief to brief.	Feb-May	1.5-3.5	Apparent	Nov-Apr	>60	---	High-----	Low.
KcE--------------- Kellison	D	None---------	---	---	>6.0	---	---	>60	---	High-----	High.
KeB, KeD---------- Keltys	B	None---------	---	---	>6.0	---	---	>60	---	High-----	High.
KfC, KgC---------- Kirvin	C	None---------	---	---	>6.0	---	---	>60	---	High-----	High.
KhC--------------- Kirvin	D	None---------	---	---	>6.0	---	---	>60	---	High-----	High.
Ko---------------- Kosse	B	Occasional	Brief-----	Oct-May	3.5-6.0	Apparent	Dec-May	>60	---	Moderate	Low.
Kp---------------- Koury	B	Frequent----	Brief-----	Jan-May	>6.0	---	---	>60	---	High-----	High.
KuB, KuD---------- Kurth	C	None---------	---	---	3.5-6.0	Perched	Jan-Apr	>60	---	High-----	Moderate.
LaA, LaB, LaE----- LaCerda	D	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate.

See footnote at end of table.

Table 16.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
Lc---------------- Laneville	B	Frequent----	Brief-----	Nov-May	1.5-3.0	Perched	Nov-May	>60	---	High-----	High.
LeB--------------- Latex	C	None--------	---	---	3.0-4.5	Perched	Jan-Apr	>60	---	Moderate	High.
LtC--------------- Lilbert	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
LvC, LvD---------- Lovelady	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
MoA--------------- Mollville	D	None--------	---	---	+.5-1.0	Perched	Nov-Mar	>60	---	High-----	High.
MpA*:											
Mollville--------	D	None--------	---	---	+.5-1.0	Perched	Nov-Mar	>60	---	High-----	High.
Besner-----------	B	None--------	---	---	4.0-6.0	Apparent	Jan-Feb	>60	---	Low------	Moderate.
MsB, MsE---------- Moswell	D	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
MxA*:											
Moten------------	C	None--------	---	---	2.5-5.0	Perched	Jan-Apr	>60	---	High-----	Moderate.
Multey-----------	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
NaG--------------- Naclina	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Nc---------------- Naconiche	D	Frequent----	Long to very long.	Jan-Dec	0-1.0	Apparent	Jan-Dec	>60	---	High-----	High.
Nh---------------- Nahatche	C	Frequent----	Very brief to brief.	Nov-May	0.5-1.5	Apparent	Nov-May	>60	---	High-----	Moderate.
Oz*:											
Ozias------------	D	Frequent----	Long------	Dec-May	0-1.5	Perched	Dec-May	>60	---	High-----	High.
Pophers----------	C	Frequent----	Long------	Jan-Jun	1.0-2.0	Apparent	Jan-Jun	>60	---	High-----	High.
PeB--------------- Penning	B	None--------	---	---	1.5-4.0	Perched	Jan-Apr	>60	---	High-----	High.
PnA--------------- Percilla	D	None--------	---	---	+1-0.5	Perched	Jan-Mar	>60	---	High-----	Moderate.
Po---------------- Pophers	C	Frequent----	Long------	Jan-Jun	1.0-2.0	Apparent	Jan-Jun	>60	---	High-----	High.
PsA--------------- Portersprings	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Low.
RnB--------------- Rentzel	C	None--------	---	---	1.5-3.0	Perched	Jan-Mar	>60	---	High-----	High.
SaB--------------- Sacul	C	None--------	---	---	2.0-4.0	Perched	Dec-Apr	>60	---	High-----	High.

See footnote at end of table.

Table 16.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
SwA*:											
Sawlit	C	None	---	---	2.0-3.5	Perched	Jan-May	>60	---	High	High.
Latex	C	None	---	---	3.0-4.5	Perched	Dec-Apr	>60	---	Moderate	High.
TaE Tenaha	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Te Texark	D	Occasional	Brief	Dec-Jun	2.0-3.5	Apparent	Dec-May	>60	---	High	Low.
Tf Texark	D	Frequent	Long	Dec-Jun	2.0-3.5	Apparent	Dec-May	>60	---	High	Low.
ToC Tonkawa	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
TrE, TwC, TwE Trawick	C	None	---	---	>6.0	---	---	20-40	Soft	High	High.
TxG*:											
Trawick	C	None	---	---	>6.0	---	---	20-40	Soft	High	High.
Bub	D	None	---	---	>6.0	---	---	12-20	Soft	High	Moderate.
WnB Woden	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
WoB, WoE Woodtell	D	None	---	---	>6.0	---	---	>60	---	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.--Physical Analyses of Selected Soils

(Dashes indicate data were not available.)

Soil name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.10 mm)	Very fine (0.10-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk density (1/3 bar)	Water content (1/3 bar)
	In		Pct (wt)								Cm/cm	g/cc	Pct (wt)
Austonio[2, 4]	0-3	A1	0.2	0.3	3.3	48.1	24.5	76.4	20.4	3.3	0.097	1.38	33.3
S89TX-225-001	3-10	A2	0.1	0.1	3.3	47.6	26.0	77.1	19.6	3.4	0.028	1.37	30.9
	10-18	E	0.1	0.1	3.5	46.0	24.9	74.6	20.2	5.3	0.019	1.39	31.0
	18-24	Bt1	0.1	0.1	2.8	34.9	17.4	55.3	17.7	27.0	0.058	1.40	28.9
	24-34	Bt2	0.1	0.1	2.3	30.5	15.3	48.3	18.4	33.3	0.067	1.36	36.0
	34-39	Bt3	0.1	0.2	2.1	36.4	16.2	55.0	17.8	27.2	0.057	1.39	33.4
	39-50	Bt4	0.1	0.1	2.7	46.2	16.6	65.7	15.6	18.7	0.020	1.30	43.7
	50-66	BCt	0.1	0.2	3.0	59.4	17.2	79.9	10.2	9.9	0.005	1.40	28.9
	66-83	2EB	0.1	0.2	2.9	83.7	10.7	97.6	1.0	1.4	0.003	1.27	28.5
	83-91	2Bt/Eg1	0.0	0.2	2.1	44.5	32.3	79.1	8.5	12.4	0.031	1.34	33.7
	91-96	2Bt/Eg2	0.1	0.1	0.7	12.2	34.5	47.6	31.3	21.1	0.041	1.41	26.8
	96-102	2BC/E	---	---	---	---	---	---	---	---	---	---	
Chireno[1, 3]	0-12	A	1.0	1.0	2.7	23.2	15.0	42.9	35.9	21.2	---	---	---
S86TX-225-006	12-20	Bt1	1.8	2.0	2.7	14.6	11.2	32.3	36.9	30.8	---	---	---
	20-25	Bt2	1.0	1.0	2.3	12.8	9.6	26.7	28.9	44.4	---	---	---
	25-41	Bt3	1.2	1.0	2.6	17.0	11.4	33.2	27.5	39.3	---	---	---
	41-60	Bt4	1.1	1.1	3.1	18.5	17.8	41.6	23.4	35.0	---	---	---
	60-83	Bt5	0.2	0.3	3.2	26.4	18.7	48.8	23.5	27.7	---	---	---
	83-100	Bt6	0.9	0.8	4.8	28.8	15.6	50.9	18.6	30.5	---	---	---
	100-112	Bt7	2.3	2.7	8.0	21.9	17.7	52.6	18.9	28.5	---	---	---
	112-124	2C	0.2	0.2	0.5	2.4	69.4	72.7	16.4	10.9	---	---	---
Eastham[2, 3, 9]	0-4	Ap	0.0	0.1	0.7	7.5	10.0	18.3	34.7	47.0	0.166	1.23	45.1
S90TX-225-001	4-17	A	0.1	0.1	0.8	5.6	7.4	14.0	25.5	60.5	0.155	1.28	38.8
	17-27	Bss1	0.0	0.0	0.6	4.0	6.0	10.6	26.5	62.9	0.144	1.35	31.7
	27-40	Bss2	0.0	0.1	0.6	3.6	4.9	9.2	30.0	60.8	0.158	1.30	36.7
	40-46	Bkss1	1.1	1.5	1.2	2.0	3.1	8.9	26.3	64.8	0.144	1.29	37.5
	46-57	Bkss2	0.5	0.5	0.7	1.5	2.5	5.7	27.5	66.8	0.168	1.20	42.9
	57-70	BCkss	0.4	0.4	0.5	1.0	4.8	7.0	48.3	44.7	0.099	1.38	34.0
	70-88	BCss	0.1	0.1	0.4	0.2	3.8	4.5	55.2	40.3	0.111	1.26	39.4
Elrose[1, 3]	0-5	Ap	0.2	0.6	3.8	36.8	31.0	72.4	23.7	3.9	---	---	---
S86TX-225-007	5-12	E	---	0.4	3.2	34.1	30.9	68.6	27.5	3.9	---	---	---
	12-20	Bt1	0.3	0.3	2.2	23.9	21.8	48.5	26.4	25.1	---	---	---
	20-42	Bt2	0.4	0.4	1.8	18.0	20.2	40.8	18.3	40.9	---	---	---
	42-64	Bt3	0.8	0.4	1.6	22.8	17.3	42.9	15.3	41.8	---	---	---
	64-70	Bt4	9.2	5.9	4.7	44.9	13.8	78.5	11.9	9.6	---	---	---
	70-80	Bt5	1.0	0.3	0.8	33.1	14.6	49.8	7.5	42.7	---	---	---
	80-91	Bt6	0.4	0.3	0.6	40.5	17.4	59.2	5.4	35.4	---	---	---
Fuller[2, 10]	0-7	A	0.0	0.2	3.4	17.7	24.3	45.6	46.8	7.6	---	---	---
S82TX-225-003	7-11	Eg1	0.0	0.3	3.6	18.2	25.3	47.4	45.1	7.5	0.004	1.56	15.5
	11-21	Eg2	0.0	0.3	3.7	17.6	24.6	46.2	44.1	9.7	0.020	1.49	16.1
	21-29	Eg3	0.1	0.2	3.7	17.2	23.5	44.7	43.7	11.6	0.028	1.52	19.4
	29-40	Eg4	0.0	0.3	3.6	16.8	23.2	43.9	43.7	12.4	0.025	1.55	18.6
	40-50	Btng/E1	0.0	0.1	3.7	14.8	20.8	38.4	41.8	20.8	0.041	1.56	24.8
	50-58	Btng/E2	0.0	0.1	1.3	6.9	17.3	25.6	38.3	36.1	0.066	1.37	33.9
	58-70	2C/Bt	0.0	0.0	0.6	3.5	13.4	17.5	38.9	43.6	0.086	1.29	36.1
	70-80	2C	0.1	0.0	0.2	1.1	8.1	9.5	38.9	51.6	0.112	1.15	43.8

See footnotes at end of table.

Table 17.--Physical Analyses of Selected Soils--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.10 mm)	Very fine (0.10-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk density (1/3 bar)	Water content (1/3 bar)
	In		Pct (wt)								Cm/cm	g/cc	Pct (wt)
Fuller[2, 5]	0-5	A1	0.0	0.2	5.9	16.8	12.8	35.7	53.8	10.5	---	---	---
S82TX-225-004	5-9	A2	0.0	0.2	6.7	18.3	13.8	39.3	49.9	10.8	0.026	1.37	20.0
	9-23	E1	0.1	0.2	6.3	17.6	13.2	37.4	49.7	12.9	0.022	1.60	19.1
	23-31	E2	0.0	0.2	6.0	17.3	12.7	36.2	48.1	15.7	0.042	1.45	22.6
	31-39	E3	0.0	0.2	6.0	17.3	13.2	36.7	48.3	15.0	0.049	1.50	26.5
	39-49	Btng/E	0.0	0.1	4.9	15.3	11.7	32.0	42.6	25.4	0.058	1.41	31.4
	49-59	2BC1	0.0	0.1	1.4	6.1	7.9	15.5	41.2	43.3	0.116	1.15	47.3
	59-69	2BC2	0.0	0.0	1.0	2.7	3.0	6.7	36.3	57.0	0.114	1.20	38.7
	69-74	2C	0.0	0.0	0.6	5.5	13.5	19.6	32.8	47.6	0.118	1.18	43.8
	74-80	3C	0.1	0.0	1.0	5.7	7.5	14.3	64.1	21.6	0.036	1.34	26.5
Grapeland[2, 3]	0-3	Ap	0.0	0.4	12.6	62.1	13.2	88.3	7.9	3.8	---	---	---
S90TX-225-005	3-12	A	0.1	0.3	12.2	63.2	13.3	89.1	7.7	3.2	0.022	1.48	21.4
	12-39	Bt1	0.0	0.2	12.1	56.1	14.9	83.3	8.9	7.8	0.033	1.35	27.4
	39-52	Bt2	0.0	0.2	10.5	54.5	14.5	79.7	11.8	8.5	0.035	1.39	30.7
	52-80	Bt3	0.0	0.1	10.4	52.7	15.2	78.4	13.2	8.4	0.027	1.45	26.3
Hainesville[2, 3]	0-5	Ap	0.2	0.2	4.1	64.5	24.9	93.9	3.9	2.2	---	---	---
S90TX-225-004	5-14	A	0.2	0.1	3.5	60.1	27.6	91.5	5.9	2.7	---	---	---
	14-28	Bw	0.1	0.0	2.8	53.7	29.8	86.4	9.3	4.3	---	---	---
	28-45	Bw/E1	0.0	0.0	3.0	54.2	29.0	86.2	9.4	4.4	---	---	---
	45-58	Bw/E2	0.0	0.1	2.3	52.0	31.6	86.0	9.9	4.1	---	---	---
	58-70	Bw/E3	0.0	0.1	2.8	50.7	31.9	85.5	10.6	3.9	---	---	---
	70-88	B&E	0.1	0.1	1.5	44.8	35.2	81.7	11.5	6.8	---	---	---
Hallsbluff[2, 3]	0-6	Ap	0.2	0.6	1.0	5.5	12.8	20.1	41.8	38.1	0.081	1.45	26.9
S90TX-225-003	6-17	A	0.1	0.4	0.8	4.6	11.6	17.5	41.9	40.6	0.096	1.39	29.4
	17-29	Bss	0.1	0.3	0.7	4.0	9.5	14.6	40.7	44.7	0.097	1.43	29.3
	29-40	Bkss1	2.3	1.5	1.0	2.2	3.8	10.8	38.0	51.2	0.106	1.42	29.5
	40-52	Bkss2	1.0	0.8	0.3	0.8	2.2	5.1	29.4	65.6	0.126	1.38	32.5
	52-80	BCss	0.4	0.2	0.1	0.0	0.4	1.1	26.0	72.9	0.133	1.37	32.3
Keltys[2, 3]	0-6	A	0.0	0.1	1.1	43.1	11.4	55.7	40.9	3.4	---	---	---
S84TX-225-003	6-11	E1	0.0	0.1	1.2	39.6	16.0	56.9	39.1	4.0	---	---	---
	11-18	E2	0.0	0.1	1.1	28.3	28.0	57.5	38.4	4.1	---	---	---
	18-25	Bt/E	0.0	0.1	1.0	30.0	24.8	55.9	36.2	7.9	---	---	---
	25-33	E/Bt1	0.0	0.1	1.1	28.5	24.3	54.0	38.6	7.4	---	---	---
	33-50	E/Bt2	0.0	0.1	1.0	28.5	20.5	50.1	35.7	14.2	---	---	---
	50-57	Bt/E	0.0	0.1	0.6	19.9	17.8	38.4	34.3	27.3	---	---	---
	57-63	C/Bt	0.0	0.1	0.3	9.1	16.6	26.1	35.9	38.0	---	---	---
	63-80	2C	0.6	0.6	0.6	10.3	16.7	28.8	32.7	38.6	---	---	---
Latex[2, 3]	0-4	A	1.0	0.7	3.1	18.6	18.8	42.2	48.0	9.8	0.069	1.13	30.9
S82TX-225-002	4-15	Bt1	3.6	2.3	2.7	15.9	17.6	42.1	33.4	24.5	0.055	1.50	25.7
	15-28	Bt2	3.4	3.1	3.7	15.1	15.9	41.2	29.7	29.1	0.029	1.67	22.5
	28-35	Bt3	2.7	2.4	3.2	13.5	15.5	37.3	27.9	34.8	0.065	1.49	27.0
	35-43	2Bt/E1	3.2	2.3	3.0	12.4	13.6	34.5	23.1	42.4	0.065	1.50	27.6
	43-56	2Bt/E2	2.6	1.9	3.1	11.8	12.5	31.9	23.8	44.3	0.075	1.41	28.3
	56-71	2Bt/E3	3.4	2.2	2.4	10.5	12.3	30.8	25.0	44.2	0.074	1.42	28.7
	71-80	2B't	3.1	1.3	1.6	6.9	9.6	22.5	24.5	53.0	0.120	1.36	33.4

See footnotes at end of table.

Table 17.--Physical Analyses of Selected Soils--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.10 mm)	Very fine (0.10-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk density (1/3 bar)	Water content (1/3 bar)
	In		Pct (wt)								Cm/cm	g/cc	Pct (wt)
Latex[1, 6]	0-4	Ap1	2.0	0.7	4.2	46.2	21.2	74.3	20.1	5.6	---	---	---
S86TX-225-005	4-9	Ap2	0.6	0.9	4.3	48.5	21.7	76.0	20.2	3.8	---	---	---
	9-20	Bt1	1.5	1.1	3.2	29.8	20.1	55.7	19.8	24.5	---	---	---
	20-31	Bt2	3.7	1.9	2.7	26.1	12.9	47.3	17.6	35.1	---	---	---
	31-39	Bt3	2.2	1.2	2.5	26.1	12.1	44.1	18.6	37.3	---	---	---
	39-52	Btv	1.2	0.7	1.9	25.5	15.3	44.6	21.3	34.1	---	---	---
	52-68	Bt/E1	2.1	1.1	2.7	32.1	12.2	50.2	20.0	29.8	---	---	---
	68-87	Bt/E2	0.5	0.5	3.0	34.8	11.2	50.0	19.5	30.5	---	---	---
	87-106	2Bt	0.2	0.2	1.7	25.0	11.7	38.8	25.6	35.6	---	---	---
Lovelady[2, 3]	0-4	A1	0.1	1.3	26.9	45.0	11.7	85.0	12.8	2.2	---	---	---
S92TX-225-001	4-11	A2	0.1	1.3	28.4	41.9	11.6	83.3	14.2	2.5	---	---	---
	11-26	E	0.1	0.7	23.1	43.0	12.8	79.7	16.7	3.6	---	---	---
	26-42	Bt/E1	0.1	0.9	23.0	34.5	8.8	67.3	12.5	20.2	---	---	---
	42-50	Bt/E2	0.0	1.1	24.8	37.1	8.2	71.2	11.0	17.8	---	---	---
	50-62	2Bt/E	0.0	0.9	29.3	35.7	4.9	70.8	8.7	21.7	---	---	---
	62-70	2Bt1	0.0	0.6	29.5	30.6	3.3	64.0	2.5	33.5	---	---	---
	70-76	2Bt2	0.1	0.5	30.7	34.0	3.2	68.5	2.2	29.3	---	---	---
	76-80	2CB	0.1	0.4	32.0	36.6	3.7	72.8	2.4	24.8	---	---	---
Pophers[2, 7]	0-5	A1	0.0	0.0	0.0	0.1	0.9	1.0	60.4	38.6	---	---	---
S81TX-225-003	5-16	A2	0.0	0.0	0.0	0.8	7.6	8.4	54.1	37.5	0.076	1.37	29.7
	16-26	Bw1	0.0	0.0	0.0	2.0	19.5	21.5	50.1	28.4	0.049	1.49	23.9
	26-31	Bw2	0.0	0.0	0.0	1.6	23.2	24.8	51.9	23.3	0.035	1.46	22.6
	31-33	Ab	0.0	0.0	0.1	1.3	21.9	23.3	53.2	23.5	---	---	---
	33-37	Bwb1	0.0	0.0	0.1	3.1	27.7	30.9	47.6	21.5	0.033	1.46	19.6
	37-43	Bwb2	0.0	0.0	0.0	2.5	20.4	22.9	52.5	24.6	0.046	1.53	21.8
	43-59	Bwb3	0.0	0.0	0.0	5.9	17.7	23.6	44.2	32.2	0.064	1.55	23.4
	59-70	Bwb4	0.1	0.1	0.1	1.5	14.5	16.3	48.3	35.4	0.067	1.54	23.8
Portersprings[2, 3]	0-9	Ap	0.0	0.3	7.9	47.1	19.5	74.8	12.7	12.5	0.019	1.40	31.3
S89TX-225-002	9-16	A	0.2	0.2	6.3	43.8	20.5	71.0	12.9	16.1	0.035	1.38	30.3
	16-22	Bt1	0.1	0.1	5.1	37.6	19.3	62.2	13.4	24.4	0.045	1.34	32.3
	22-29	Bt2	0.1	0.1	5.0	36.2	20.3	61.7	12.9	25.5	0.026	1.38	31.6
	29-42	Bt3	0.1	0.1	5.1	39.1	24.3	68.7	11.9	19.4	0.035	1.39	29.1
	42-51	BCt1	0.1	0.2	9.2	47.1	21.9	78.5	8.4	13.1	0.039	1.41	27.4
	51-58	BCt2	0.1	0.2	17.4	50.2	18.0	85.9	6.1	8.0	0.027	1.43	25.6
	58-72	BCt3	0.1	0.2	4.5	46.2	29.6	80.6	10.0	9.4	---	---	---
	72-87	2C	0.0	0.4	0.4	81.1	13.5	95.4	1.6	3.1	0.029	1.44	22.7
Trawick[1, 8]	0-4	A	10.0	7.0	7.5	13.7	9.8	48.0	26.1	25.9	0.008	1.41	30.1
S88TX-225-002	4-14	Bt1	9.9	5.7	5.3	6.8	5.7	33.4	17.3	49.3	0.024	1.29	34.5
	14-23	Bt2	5.7	4.0	4.3	6.2	5.9	26.1	15.0	58.9	0.053	1.13	44.8
	23-34	Cr1	6.1	8.9	15.2	17.8	9.5	57.5	15.4	27.1	0.006	1.09	29.7
	34-48	Cr2	4.9	5.6	8.6	15.3	9.3	43.7	18.6	37.7	0.010	1.37	37.9
	48-65	2C1	4.4	4.3	7.0	12.1	6.3	34.1	13.2	52.7	0.044	1.14	49.3
	65-79	2C2	5.5	4.9	7.0	9.6	3.5	30.5	12.8	56.7	0.062	1.22	44.1
Trawick[1, 3]	0-4	A	4.5	5.7	8.2	22.6	14.0	55.0	25.2	19.8	0.022	1.15	19.3
S89TX-225-002	4-10	AB	10.3	8.9	7.5	18.2	10.9	55.8	22.8	21.4	0.039	1.59	21.7
	10-23	Bt	1.9	3.1	4.6	10.7	8.8	29.1	18.1	52.8	0.027	1.31	34.0
	23-38	BCt	1.1	2.1	6.1	13.4	9.2	31.9	17.6	50.5	0.023	1.28	36.0
	38-48	CR1	4.6	5.2	7.8	18.0	10.4	46.0	15.9	38.1	0.017	1.30	37.5
	48-56	CR2	1.9	2.8	6.8	23.2	12.1	46.8	14.4	38.8	0.013	1.48	32.9
	56-67	C1	0.9	0.9	4.4	12.0	6.2	24.4	15.0	60.6	0.044	1.17	45.8
	67-85	C2	0.7	2.0	5.2	10.1	5.6	23.6	17.5	58.9	0.089	1.14	43.9

See footnotes at end of table.

Table 17.--Physical Analyses of Selected Soils--Continued

[1] Analysis by the National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

[2] Analysis by the Soil Characterization Laboratory, Texas A&M University, College Station, Texas.

[3] Location of the pedon sampled is the same as that of the typical pedon described in the section "Soil Series and Their Morphology."

[4] Location of pedon sampled: From Farm Road 1280 in Austonio; 5.0 miles southwest on Texas Highway 21; 1.6 miles west on Farm Road 2498; 1,500 feet south in a pasture. The matrix colors of this soil are not typical.

[5] Location of pedon sampled: From Farm Road 357 in Kennard; 3.5 miles west on Texas Highway 7; 0.4 mile southeast on U.S. Forest Service Road 533a; 30 feet south in a forest. The surface of this soil is too thick.

[6] Location of pedon sampled: From Texas Highway 19 in Grapeland; 3.0 miles east on Farm Road 228; 0.6 mile south on farm lane; 2,000 feet east in a pasture. The base saturation is low for this soil.

[7] Location of pedon sampled: From Loop 304 in Crockett; 8.5 miles west on U.S. Highway 287 to Shady Grove Baptist Church; 0.8 mile south on county road; 0.4 mile east and southeast on lane to farmstead; 1.25 miles south-southeast on lane; 0.15 mile southeast of bridge; 20 feet northeast of lane. This soil has a chroma of 2 and redoximorphic concentrations.

[8] Location of pedon sampled: From the intersection of U.S. Highway 287 and Farm Road 228 in Grapeland; 11.1 miles east on Farm Road 228; 0.8 mile south on a country road; then 150 feet west of the road.

[9] This pedon has a weighted average clay content slightly more than 60 percent in the 10- to 40-inch control section (61.4 percent); however it is felt that this is within the range of normal lab error.

[10] Location of pedon sampled: About 4 miles southwest of Kennard on Texas Highway 7; 1.2 miles south on U.S. Forest Service Road 514; 0.55 mile east along woods road and 30 feet north into woodland.

Table 18.--Chemical Analyses of Selected Soils

(Dashes indicate data were not available. TR indicates a trace amount.)

Soil name and sample number	Depth	Horizon	Extractable bases Ca	Mg	K	Na	Cation-exchange capacity	Base saturation	Reaction 1:1 soil:H2O	Organic carbon	Aluminum saturation	Exchangeable sodium
	In		Meq/100 grams of soil					Pct	pH	Pct		
Austonio[2, 4]	0-3	A1	4.1	0.8	0.2	0.1	5.2	100	6.5	0.97	1.2	2
S89TX-225-001	3-10	A2	1.1	0.4	0.1	0.1	1.7	53	5.7	0.25	1.3	3
	10-18	E	1.1	0.4	0.1	0.1	1.7	59	5.8	0.15	2.4	3
	18-24	Bt1	5.7	3.3	0.5	0.1	9.6	90	5.1	0.33	2.4	1
	24-34	Bt2	6.1	4.8	0.4	0.1	11.4	87	4.9	0.33	2.3	1
	34-39	Bt3	4.6	4.9	0.4	0.1	9.9	82	4.7	0.23	2.3	1
	39-50	Bt4	4.3	3.7	0.2	0.1	8.4	98	4.4	0.13	1.2	1
	50-66	BCt	1.9	2.2	0.1	0.1	4.3	88	4.7	0.06	0.0	2
	66-83	2EB	0.4	0.4	0.0	0.1	0.9	50	4.0	0.06	0.0	6
	83-91	2Bt/Eg1	3.0	2.3	0.3	0.1	5.7	90	5.2	0.06	0.6	2
	91-96	2Bt/Eg2	5.8	4.7	0.5	0.2	11.2	90	5.7	0.12	0.0	2
	96-102	2BC/E	---	---	---	---	---	---	---	---	---	---
Chireno[1, 3]	0-12	A	10.8	5.1	0.2	0.1	16.2	73	6.1	1.73	0.3	---
S86TX-225-006	12-20	Bt1	14.4	6.7	0.3	0.1	21.5	78	6.6	0.91	0.4	---
	20-25	Bt2	15.8	10.9	0.4	0.2	27.3	79	6.8	0.74	0.6	---
	25-41	Bt3	15.6	8.6	0.4	0.1	24.7	82	6.9	0.55	0.6	---
	41-60	Bt4	11.1	7.6	0.3	0.2	19.2	83	6.9	0.36	0.5	---
	60-83	Bt5	8.0	5.6	0.2	0.1	13.9	84	6.9	0.18	0.3	---
	83-100	Bt6	8.3	6.4	0.2	0.1	15.0	83	6.9	0.11	0.5	---
	100-112	Bt7	11.6	7.3	0.2	0.1	19.2	82	7.0	0.13	0.6	---
	112-124	2C	3.8	2.7	0.1	---	6.6	86	7.0	0.08	0.1	---
Eastham[2, 3]	0-4	Ap	37.3	5.7	0.9	0.3	44.3	100	6.0	2.02	---	1
S90TX-225-001	4-17	A	36.9	6.4	0.6	0.8	44.8	100	5.7	0.94	---	2
	17-27	Bss1	36.8	6.5	0.6	1.5	45.4	100	5.4	0.87	---	1
	27-40	Bss2	43.1	6.5	0.5	3.0	53.1	100	7.2	0.97	---	6
	40-46	Bkss1	67.7	6.2	0.6	3.9	78.4	100	7.8	0.55	---	9
	46-57	Bkss2	68.3	6.4	0.5	4.6	79.7	100	7.8	0.40	---	8
	57-70	BCkss	50.6	4.0	0.3	3.4	58.4	100	7.7	0.29	---	7
	70-88	BCss	32.9	3.6	0.3	2.6	39.4	100	7.7	0.30	---	6
Elrose[1, 3]	0-5	Ap	0.7	0.1	0.1	TR	0.9	24	4.2	0.98	TR	---
S86TX-225-007	5-12	E	0.6	0.1	0.1	0.1	0.8	40	4.7	0.26	TR	---
	20-42	Bt2	5.8	1.6	0.3	0.1	7.8	56	5.2	0.19	0.3	---
	12-20	Bt1	4.1	0.8	0.5	0.1	5.5	58	5.8	0.29	0.2	---
	42-64	Bt3	5.1	1.9	0.2	0.1	7.3	58	5.5	0.12	0.4	---
	64-70	Bt4	1.4	0.6	TR	TR	2.0	48	6.5	0.07	0.3	---
	70-80	Bt5	6.3	2.4	0.2	0.1	9.0	63	5.7	0.12	0.6	---
	80-91	Bt6	4.4	2.1	0.2	TR	6.7	61	5.7	0.09	0.5	---
Fuller[2, 9]	0-7	A1	2.3	0.9	0.1	0.0	3.3	33	4.5	1.91	2.0	0
S82TX-225-003	7-11	A2	1.5	1.3	0.0	0.1	2.9	47	4.8	0.81	1.5	1
	11-21	E1	2.2	1.5	0.1	0.1	3.9	57	5.1	0.21	1.6	1
	21-29	E2	2.3	1.7	0.1	0.3	4.5	55	5.1	0.18	1.7	3
	29-40	E3	3.1	2.1	0.1	0.7	6.1	69	5.3	0.15	1.1	7
	40-50	Btng/E	6.3	3.9	0.2	1.6	12.0	83	5.1	0.17	0.2	10
	50-58	2Bt/E	15.1	9.1	0.4	3.9	28.5	95	6.1	0.13	---	11
	58-70	2Bt/C	19.7	10.8	0.5	5.1	36.1	---	7.3	0.15	---	11
	70-80	2C	27.9	12.1	0.6	5.4	46.1	---	7.3	0.17	---	10

See footnotes at end of table.

Table 18.--Chemical Analyses of Selected Soils--Continued

Soil name and sample number	Depth	Horizon	Extractable bases Ca	Mg	K	Na	Cation-exchange capacity	Base saturation	Reaction 1:1 soil:H2O	Organic carbon	Aluminum saturation	Exchangeable sodium
	In		------Meq/100 grams of soil------					Pct	pH	----------Pct----------		
Fuller[2, 5]	0-5	A1	6.0	1.2	0.1	0.1	7.4	---	5.4	1.41	0.3	---
S82TX-225-004	5-9	A2	1.1	0.7	0.1	0.1	2.0	31	4.6	0.68	2.0	1
	9-23	E1	0.6	1.3	0.1	0.1	2.1	28	4.7	0.43	2.9	1
	23-31	E2	1.4	1.7	0.1	0.3	3.5	38	4.8	0.22	2.8	3
	31-39	E3	2.2	1.8	0.1	0.7	4.9	54	4.7	0.20	1.8	8
	39-49	Btng/E	6.4	4.3	0.2	2.9	13.8	84	4.8	0.26	0.4	14
	49-59	2BC1	11.6	9.2	0.3	6.6	27.7	91	5.9	0.29	---	15
	59-69	2BC2	15.7	11.9	0.4	8.7	36.8	92	6.8	0.21	---	16
	69-74	2C	13.1	9.2	0.3	7.0	29.7	87	7.1	0.17	---	15
	74-80	3C	6.4	3.7	0.1	3.4	13.5	---	7.3	0.12	---	17
Grapeland[2, 3]	0-3	Ap	0.8	0.4	0.1	0.1	1.4	50	5.1	0.44	0.0	4
S90TX-225-005	3-12	A	0.4	0.1	0.1	0.1	0.7	32	4.7	0.22	0.0	5
	12-39	Bt1	0.9	0.3	0.1	0.1	1.4	47	4.4	0.13	0.0	3
	39-52	Bt2	0.4	0.4	0.1	0.1	1.0	32	4.5	0.38	0.0	3
	52-80	Bt3	0.3	0.2	0.0	0.1	0.6	19	4.8	0.42	0.6	3
Haineville[2, 3]	0-5	Ap	4.5	1.8	0.1	0.2	6.6	73	5.5	1.63	0.0	2
S90TX-225-004	5-14	A	5.0	2.9	0.2	0.2	8.3	93	5.5	0.60	0.0	2
	14-28	Bw	4.4	4.2	0.2	0.2	9.0	68	4.5	0.38	0.6	2
	28-45	Bw/E1	4.3	4.5	0.2	0.3	9.3	65	4.4	0.32	0.1	2
	45-58	Bw/E2	5.6	6.6	0.3	0.5	13.0	60	4.2	0.31	2.4	2
	58-70	Bw/E3	6.3	7.6	0.3	0.7	14.9	65	4.0	0.29	2.2	2
	70-88	B&E	10.5	8.2	0.4	1.2	20.3	82	5.3	0.31	0.0	2
Hallsbluff[2, 3]	0-6	Ap	59.5	1.5	0.5	0.2	61.8	100	7.7	1.50	---	0
S90TX-225-003	6-17	A	44.4	1.2	0.4	0.2	46.2	100	7.6	1.30	---	0
	17-29	Bss	42.1	1.7	0.4	0.3	44.5	100	7.7	0.95	---	0
	29-40	Bkss1	63.1	2.4	0.4	1.1	67.1	100	8.0	0.32	---	3
	40-52	Bkss2	64.7	2.9	0.5	2.2	70.3	100	8.0	0.20	---	4
	52-80	BCss	67.8	3.4	0.6	2.7	74.5	100	8.1	0.23	---	7
Keltys[2, 3]	0-6	A	2.1	0.4	0.0	0.0	2.5	40	5.2	1.33	0.1	0
S84TX-225-003	6-11	E1	0.7	0.2	0.0	0.0	0.9	47	5.3	0.22	0.5	0
	11-18	E2	0.6	0.2	0.0	0.0	0.8	53	5.3	0.12	0.1	0
	18-25	Bt/E	1.2	0.6	0.0	0.0	1.8	69	4.9	0.14	0.9	0
	25-33	E/Bt1	0.8	0.6	0.0	0.0	1.4	42	4.6	0.13	2.1	0
	33-50	E/Bt2	1.0	1.1	0.0	0.3	2.4	38	4.6	0.13	3.8	5
	50-57	Bt/E	3.4	3.1	0.1	1.1	7.7	61	4.8	0.10	3.2	9
	57-63	C/Bt	6.5	6.1	0.1	2.3	15.0	75	4.5	0.08	4.7	12
	63-80	2C	7.6	6.4	0.1	2.9	17.0	85	4.3	0.07	4.6	15
Latex[2, 3]	0-4	A	1.4	1.6	0.2	0.1	3.4	22	5.7	3.06	---	1
S82TX-225-002	4-15	Bt1	5.4	2.3	0.1	0.1	7.9	59	5.1	0.46	1.6	1
	15-28	Bt2	5.1	2.1	0.1	0.2	7.5	51	5.1	0.24	2.4	1
	28-35	Bt3	5.9	2.4	0.1	0.3	8.7	51	5.2	0.24	3.4	2
	35-43	2Bt/E1	7.5	2.8	0.2	0.4	11.0	51	5.2	0.24	4.7	2
	43-56	2Bt/E2	9.3	3.0	0.2	0.6	13.2	57	5.3	0.28	4.2	3
	56-71	2Bt/E3	12.6	3.6	0.2	1.0	17.4	71	5.5	0.26	1.3	4
	71-80	2B't	18.9	4.4	0.2	1.8	25.3	85	5.2	0.21	0.6	6
Latex[1, 6]	0-4	Ap1	1.7	0.5	0.1	TR	1.7	57	5.4	0.26	0.1	---
S86TX-225-005	4-9	Ap2	2.2	0.7	0.2	TR	3.5	47	4.7	0.13	0.1	---
	9-20	Bt1	4.2	2.1	0.2	0.1	4.2	61	5.9	0.36	0.4	---
	20-31	Bt2	4.3	3.5	0.1	0.1	6.6	55	5.9	0.24	0.7	---
	31-39	Bt3	3.0	3.4	0.6	0.1	6.9	51	5.4	0.18	0.8	---
	39-52	Btv	2.4	2.8	0.1	0.1	7.9	41	5.1	0.09	0.6	---
	52-68	Bt/E1	1.7	2.0	0.1	0.1	7.0	36	5.1	0.08	0.6	---
	68-87	Bt/E2	3.0	2.4	0.1	0.1	6.2	47	5.0	0.04	0.5	---
	87-106	2Bt	9.5	4.9	0.2	0.1	5.2	74	5.2	0.01	0.2	---

See footnotes at end of table.

Table 18.--Chemical Analyses of Selected Soils--Continued

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: K	Extractable bases: Na	Cation-exchange capacity	Base saturation	Reaction 1:1 soil:H20	Organic carbon	Aluminum saturation	Exchangeable sodium
	In		Meq/100 grams of soil					Pct	pH	Pct		
Lovelady[2, 3]	0-4	A1	2.9	0.8	0.1	0.2	4.0	89	6.2	0.91	0.0	---
S92TX-225-001	4-11	A2	1.6	0.4	0.1	0.1	2.2	100	6.0	0.34	0.0	---
	11-26	E	0.8	0.4	0.0	0.1	1.3	100	5.9	0.09	0.0	---
	26-42	Bt/E1	3.8	1.4	0.4	0.1	5.7	84	5.8	0.15	0.0	---
	42-50	Bt/E2	3.0	1.6	0.2	0.1	4.9	88	5.4	0.10	0.0	---
	50-62	2Bt/E	2.8	2.4	0.3	0.1	5.6	75	4.9	0.10	0.3	---
	62-70	2Bt1	1.6	3.0	0.4	0.3	5.3	40	4.1	0.14	6.0	---
	70-76	2Bt2	1.3	2.8	0.3	0.3	4.7	37	3.8	0.09	6.1	---
	76-80	2CB	0.8	2.2	0.3	0.2	3.5	33	3.9	0.08	4.7	---
Pophers[2, 7]	0-5	A1	0.3	2.1	0.1	1.1	8.6	32	4.3	5.07	5.0	---
S81TX-225-003	5-16	A2	6.9	2.8	0.5	0.3	10.5	39	4.6	0.71	2.3	---
	16-26	Bw1	6.5	3.9	0.2	0.2	10.8	60	4.8	0.43	0.7	---
	26-31	Bw2	6.0	3.8	0.2	0.2	10.5	77	5.0	0.40	0.3	---
	31-33	Ab	5.7	3.9	0.2	0.2	10.2	80	5.1	0.59	0.2	---
	33-37	Bwb1	5.4	3.5	0.2	0.3	9.4	79	5.0	0.31	0.1	---
	37-43	Bwb2	6.2	4.5	0.2	0.3	11.2	81	5.2	0.31	0.1	---
	43-59	Bwb3	8.9	6.4	0.3	0.3	15.9	91	5.3	0.46	0.1	---
	59-70	Bwb4	9.8	7.2	0.3	0.4	17.7	91	5.4	0.28	0.1	---
Portersprings[2, 3]	0-9	Ap	7.4	0.9	0.1	0.3	8.8	85	4.8	1.02	0.0	3
S89TX-225-002	9-16	A	7.6	0.5	0.2	0.3	8.6	86	5.0	0.64	0.0	3
	16-22	Bt1	10.3	0.4	0.3	0.3	11.3	82	4.9	0.66	0.6	2
	22-29	Bt2	10.3	0.2	0.3	0.3	11.1	83	5.0	0.47	1.3	2
	29-42	Bt3	8.6	0.2	0.2	0.3	9.3	96	5.0	0.24	1.2	3
	42-51	BCt1	5.8	0.0	0.1	0.2	6.1	87	4.9	0.14	1.2	3
	51-58	BCt2	3.9	0.0	0.1	0.2	4.2	86	5.7	0.10	0.6	4
	58-72	BCt3	5.5	0.1	0.1	0.5	6.2	100	7.5	0.08	1.3	9
	72-87	2C	2.0	0.0	0.0	0.3	2.3	100	7.7	0.05	0.6	16
Trawick[1, 8]	0-4	A	13.6	1.9	0.6	0.1	16.2	63	6.2	2.39	0.6	---
S86TX-225-002	4-14	Bt1	11.3	2.5	0.2	0.1	14.1	58	6.3	0.75	0.8	---
	14-23	Bt2	16.8	4.4	0.3	0.2	21.7	66	6.1	0.46	1.0	---
	23-34	Cr1	12.4	7.3	0.3	0.2	20.2	55	5.2	0.03	1.0	---
	34-48	Cr2	14.4	12.7	0.3	0.2	27.6	42	4.8	0.03	1.0	---
	48-65	2C1	15.0	18.2	0.4	0.2	33.8	59	4.7	0.12	0.7	---
	65-79	2C2	16.5	21.8	0.5	0.3	39.1	67	4.3	0.11	0.5	---
Trawick[1, 3]	0-4	A	16.6	3.2	1.1	0.3	21.2	74	6.8	4.16	0.4	---
S89TX-225-002	4-10	AB	9.3	1.6	0.2	---	11.1	63	6.6	1.02	0.6	---
	10-23	Bt	11.7	4.2	0.3	---	16.2	60	6.7	0.52	1.1	---
	23-38	BCt	10.2	9.0	0.3	---	19.5	57	6.1	0.23	1.1	---
	38-48	Cr1	8.0	7.7	0.2	---	15.9	50	6.1	0.14	1.1	---
	48-56	Cr2	10.4	11.2	0.3	---	21.9	55	5.9	0.06	1.0	---
	56-67	2C1	13.5	14.7	0.4	---	28.6	64	5.8	0.12	1.1	---
	67-85	2C2	22.1	27.2	0.5	TR	49.8	77	5.6	0.14	0.8	---

[1] Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

[2] Analysis by Soil Characterization Laboratory, Texas A&M University, College Station, Texas.

[3] Location of the pedon sampled is the same as that of the typical pedon described in the section "Soil Series and Their Morphology."

[4] Location of pedon sampled: From Farm Road 1280 in Austonio; 5.0 miles southwest on Texas Highway 21; 1.6 miles west on Farm Road 2498; 1,500 feet south in a pasture. The matrix colors of this soil are not typical.

[5] Location of pedon sampled: From Farm Road 357 in Kennard; 3.5 miles west on Texas Highway 7; 0.4 mile southeast on U.S. Forest Service Road 533a; 30 feet south in a forest. The surface of this soil is too thick.

[6] Location of pedon sampled: From Texas Highway 19 in Grapeland; 3.0 miles east on Farm Road 228; 0.6 mile south on farm lane; 2,000 feet east in a pasture. The base saturation is low for this soil.

[7] Location of pedon sampled: From Loop 304 in Crockett; 8.5 miles southeast on U.S. Highway 287 to Shady Grove Baptist Church; 0.8 mile south on county road; 0.4 mile east and southeast on lane to farmstead; 1.25 miles south-southeast on lane; 0.15 mile southeast of bridge; 20 feet northeast of lane. This soil has a chroma of 2 and redoximorphic concentrations.

Table 18.--Chemical Analyses of Selected Soils--Continued

[8] Location of pedon sampled: From the intersection of U.S. Highway 287 and Farm Road 228 in Grapeland; 11.1 miles east on Farm Road 228; 0.8 mile south on a country road; then 150 feet west of the road.

[9] Location of pedon sampled: About 4 miles southwest of Kennard on Texas Highway 7; 1.2 miles south on U.S. Forest Service Road 514; 0.55 mile east along woods road and 30 feet north into woodland. This pedon has exchangeable sodium too low to classify as a Natraqualf.

Table 19.--Engineering Index Test Data

(Dashes indicate data were not available. NP means nonplastic.)

Soil name, map symbol, report number, horizon, and depth in inches	Classification		Grain-size distribution: Percentage passing sieve--						Liquid limit	Plasticity index	Specific gravity (particle density)	Shrinkage		
	AASHTO	Unified	5/8 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200				Limit	Linear	Ratio
									Pct		g/cc	Pct	Pct	
Annona:[1] AnB														
S85THD-225-002														
A --------- 0-4	A-4	CL-ML	100	100	100	100	100	70	26	5	2.67	22	1.8	1.66
Bt2 ------- 16-27	A-7(32)	CL	100	100	100	100	100	88	56	33	2.68	12	19.8	2.03
Bt3 ------- 27-38	A-7(32)	CL	100	100	100	100	100	89	52	34	2.65	13	18.8	2.05
Bt4 ------- 38-52	A-7(32)	CL	100	100	100	100	100	88	51	34	2.61	12	17.4	2.03
Besner:[1] BeA														
S85THD-225-001														
E --------- 10-28	A-4(0)	ML	100	100	100	100	100	25	22	1	2.65	21	0.0	1.50
Bt/E ------ 38-65	A-4(0)	ML	100	100	100	100	100	29	20	3	2.68	21	0.0	1.43
Keltys:[1] KeB														
S84THD-225-003														
E --------- 11-18	A-4(0)	ML	100	100	100	100	100	57	20	1	2.66	19	0.0	1.58
Bt/E ------ 18-25	A-4(2)	CL-ML	100	100	100	100	100	61	25	8	2.65	20	3.0	1.73
E/Bt ------ 25-33	A-4(0)	ML	100	100	100	100	100	61	18	1	2.62	19	0.0	1.61
Kosse:[2] Ko														
S85THD-225-003														
A --------- 0-14	A-6(10)	CL	100	100	100	100	100	60	42	21	2.59	17	11.6	1.80
Bg1 ------- 14-26	A-7(8)	CL	100	100	100	100	100	53	38	21	2.60	17	9.3	1.85
Bg2 ------- 26-56	A-6(7)	CL	100	100	100	100	100	52	39	21	2.65	15	11.5	1.87
Kurth:[3] KuB														
S84THD-225-001														
E2 -------- 11-20	A-4(0)	ML	100	100	99	99	98	27	19	1	2.69	20	0.0	1.61
2Bt2 ------ 32-46	A-7(12)	CL	100	100	100	100	100	53	49	30	2.68	16	14.5	1.84
2C -------- 71-80	A-7(30)	CH	100	100	100	100	100	83	53	35	2.75	16	16.3	1.88
Lilbert:[1] LtC														
S85THD-225-004														
E --------- 5-27	A-4(0)	ML	100	100	100	100	100	28	19	2	2.71	18	0.0	1.71
Bt1 ------- 27-38	A-6(7)	CL	100	100	100	100	100	52	37	21	2.66	17	9.8	1.84
Bt2 ------- 38-43	A-6(7)	CL	100	100	100	100	100	53	37	21	2.69	16	10.2	1.82

[1] Location of the pedon sampled is the same as that of the typical pedon described in the section "Soil Series and Their Morphology."

[2] Location of pedon sampled: From Farm Road 132 in Portersprings; 7.0 miles southwest; 0.2 mile west across cattle on an oil field road; 2.1 miles south on an oil field road to oil tanks; 0.2 mile northeast of oil tanks. This soil is a taxadjunct because data shows this soil has a fine control-section.

[3] Location of pedon sampled: From Farm Road 227 in Ratcliff; 2.5 miles east on Texas Highway 7; 1.8 miles south on U.S. Forest Service Road 562; 0.1 mile east on woods trail; 0.1 mile southeast on trail; 50 feet south. This soil is a taxadjunct because data shows this soil has a fine control-section and base saturation less than 35 percent.

Table 20.--Classification of the Soils

Soil name	Family or higher taxonomic class
Alazan	Fine-loamy, siliceous, thermic Aquic Glossudalfs
Alto	Fine-loamy, siliceous, thermic Typic Hapludalfs
Annona	Fine, smectitic, thermic Vertic Paleudalfs
Attoyac	Fine-loamy, siliceous, thermic Typic Paleudalfs
Austonio	Fine-loamy, siliceous, thermic Typic Hapludalfs
Bernaldo	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Besner	Coarse-loamy, siliceous, thermic Typic Glossudalfs
Betis	Sandy, siliceous, thermic Psammentic Paleudults
Bowie	Fine-loamy, siliceous, thermic Plinthic Paleudults
Bub	Clayey, mixed, thermic, shallow Typic Hapludalfs
Chireno	Fine, mixed, thermic Pachic Argiudolls
Cuthbert	Clayey, mixed, thermic Typic Hapludults
Darco	Loamy, siliceous, thermic Grossarenic Paleudults
Derly	Fine, smectitic, thermic Typic Glossaqualfs
Eastham	Fine, smectitic, thermic Typic Hapluderts
Elrose	Fine-loamy, siliceous, thermic Typic Paleudalfs
Etoile	Fine, smectitic, thermic Vertic Hapludalfs
Freestone	Fine-loamy, siliceous, thermic Glossaquic Paleudalfs
Fuller	Fine-loamy, siliceous, thermic Albic Glossic Natraqualfs
Garner	Fine, smectitic, thermic Oxyaquic Hapluderts
Grapeland	Sandy, siliceous, thermic Psammentic Paleudults
Hainesville	Thermic, coated Argic Quartzipsamments
Hallsbluff	Fine, smectitic, thermic Typic Hapluderts
Hannahatchee	Fine-loamy, siliceous, thermic Dystric Fluventic Eutrochrepts
Herty	Fine, smectitic, thermic Oxyaquic Vertic Hapludalfs
Iulus	Coarse-loamy, siliceous, thermic Fluvaquentic Dystrochrepts
Kaufman	Very-fine, smectitic, thermic Typic Hapluderts
Kellison	Fine, smectitic, thermic Vertic Hapludalfs
Keltys	Coarse-loamy, siliceous, thermic Typic Glossudalfs
Kirvin	Clayey, mixed, thermic Typic Hapludults
Kosse	Fine-loamy, mixed, thermic Fluventic Hapludolls
Koury	Coarse-silty, siliceous, thermic Dystric Fluventic Eutrochrepts
Kurth	Fine-loamy, siliceous, thermic Typic Glossudalfs
LaCerda	Very-fine, smectitic, thermic Chromic Dystruderts
Laneville	Fine-silty, siliceous, thermic Fluvaquentic Eutrochrepts
Latex	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Lilbert	Loamy, siliceous, thermic Arenic Plinthic Paleudults
Lovelady	Loamy, mixed, thermic Arenic Glossudalfs
Mollville	Fine-loamy, siliceous, thermic Typic Glossaqualfs
Moswell	Very-fine, smectitic, thermic Vertic Hapludalfs
Moten	Coarse-loamy, siliceous, thermic Oxyaquic Glossudalfs
Multey	Coarse-loamy, siliceous, thermic Typic Glossudalfs
Naclina	Fine, smectitic, thermic Chromic Hapluderts
Naconiche	Sandy, siliceous, thermic Cumulic Humaquepts
Nahatche	Fine-loamy, siliceous, nonacid, thermic Aeric Fluvaquents
Ozias	Fine, smectitic, thermic Aeric Dystraquerts
Penning	Fine-loamy, siliceous, thermic Aquic Glossudalfs
Percilla	Fine, mixed, thermic Aeric Epiaqualfs
Pophers	Fine-silty, siliceous, acid, thermic Aeric Fluvaquents
Portersprings	Fine-loamy, siliceous, thermic Typic Argiudolls
Rentzel	Loamy, siliceous, thermic Arenic Plinthaquic Paleudults
Sacul	Clayey, mixed, thermic Aquic Hapludults
Sawlit	Fine-loamy, siliceous, thermic Aquic Glossudalfs
Tenaha	Loamy, siliceous, thermic Arenic Hapludults
Texark	Very-fine, smectitic, thermic Aquic Hapluderts
Tonkawa	Thermic, coated Typic Quartzipsamments
Trawick	Fine, mixed, thermic Mollic Hapludalfs
Woden	Coarse-loamy, siliceous, thermic Typic Paleudalfs
Woodtell	Fine, smectitic, thermic Vertic Hapludalfs

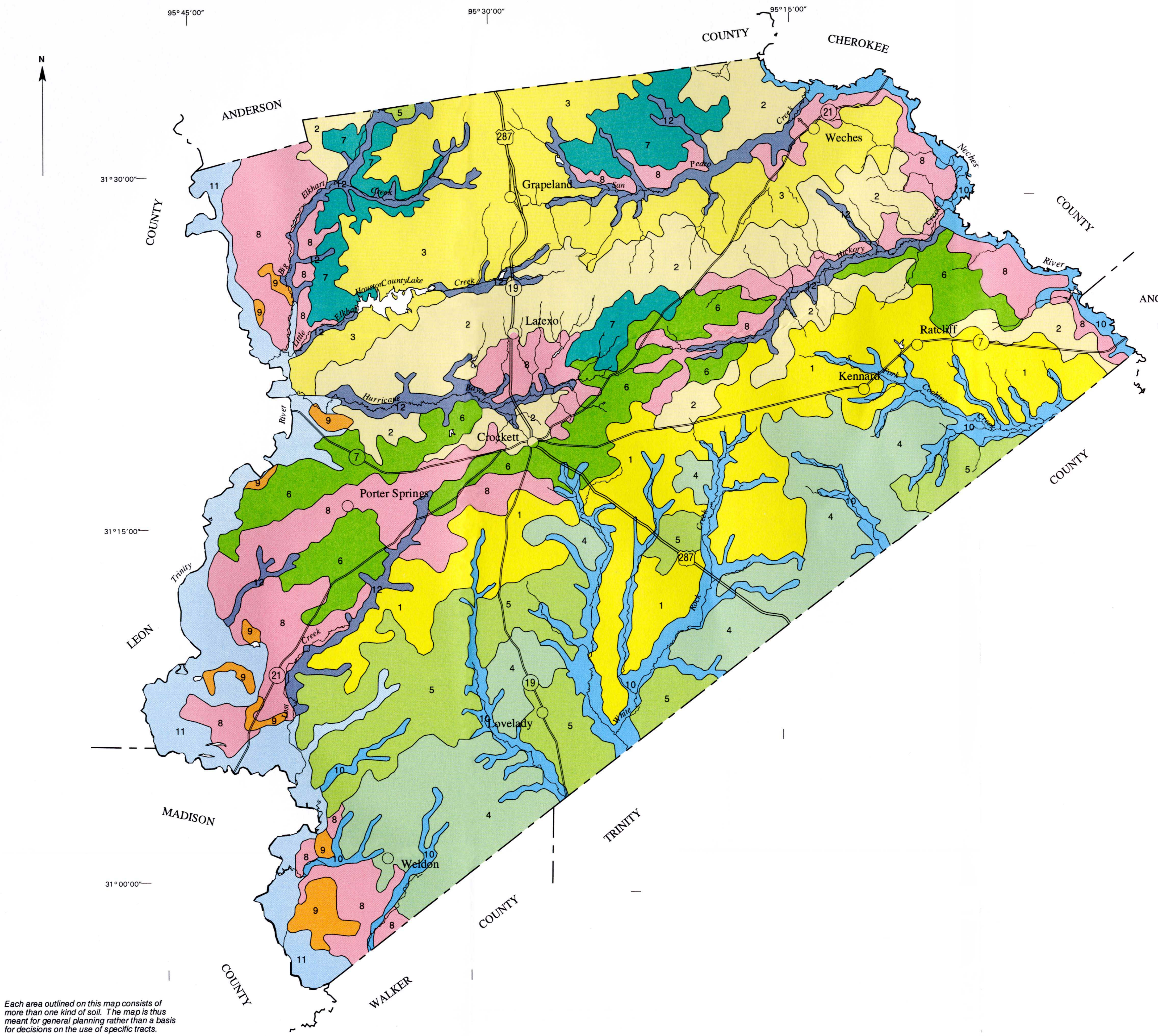
NRCS Accessibility Statement

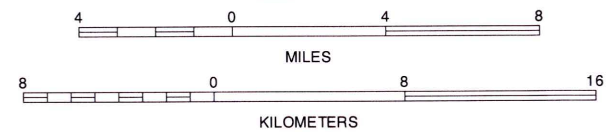
The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at helpdesk@helpdesk.itc.nrcs.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION
TEXAS STATE SOIL AND WATER CONSERVATION BOARD

GENERAL SOIL MAP
HOUSTON COUNTY, TEXAS

Scale 1:316800





SOIL LEGEND*

NEARLY LEVEL TO STEEP, SANDY, CLAYEY, AND LOAMY SOILS ON UPLANDS

1	Kurth-Fuller-Keltys
2	Cuthbert-Kirvin-Lilbert
3	Lilbert-Betis-Darco
4	Fuller-Penning-Herty
5	Herty-Moswell-Fuller
6	Woodtell-Etoile
7	Alto-Trawick

NEARLY LEVEL TO GENTLY SLOPING, LOAMY, AND CLAYEY SOILS ON PLEISTOCENE TERRACES

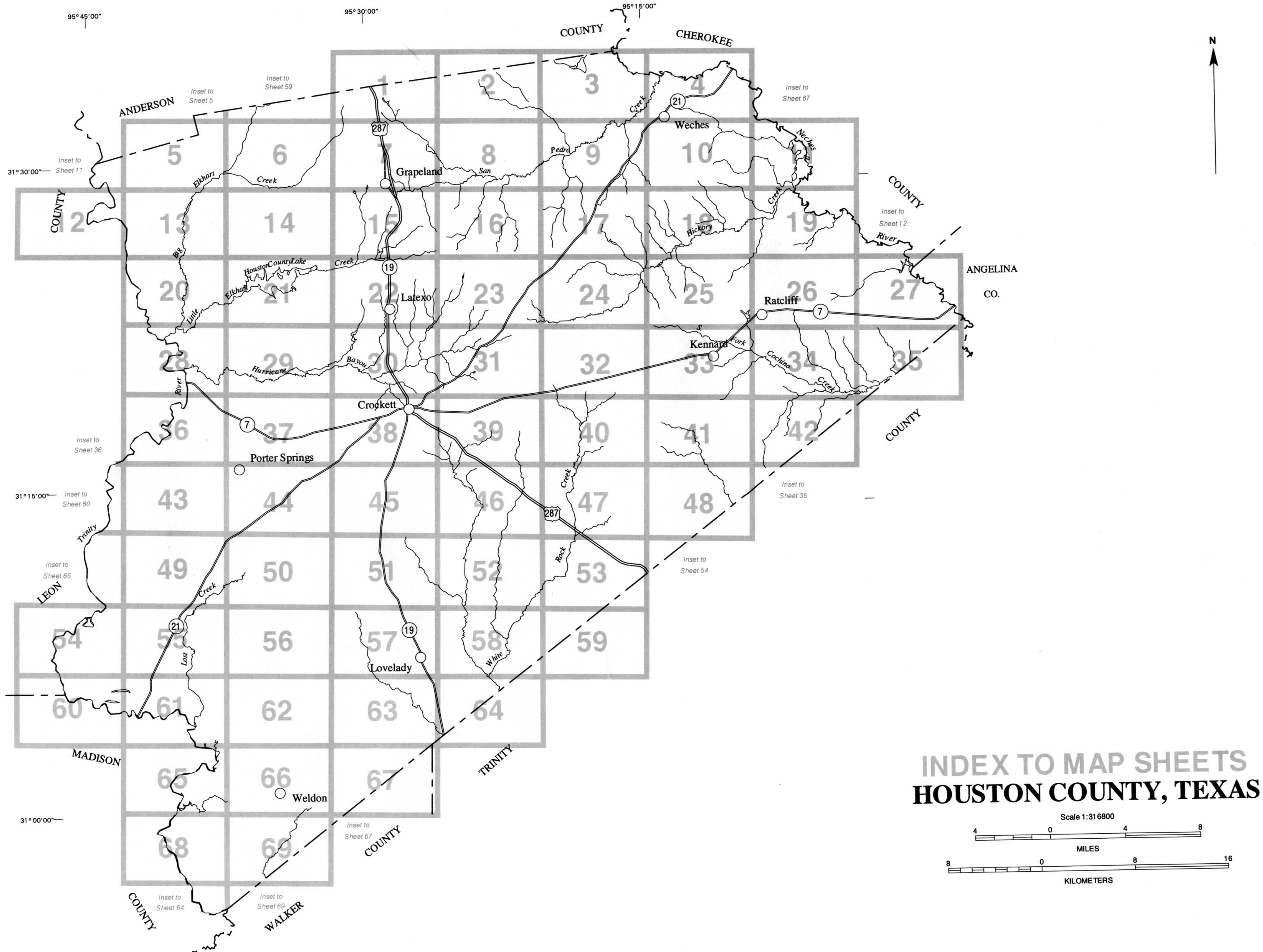
8	Freestone-Latex-Annona
9	Eastham-Garner-Hallsbluff

NEARLY LEVEL, LOAMY AND CLAYEY SOILS ON FLOOD PLAINS

10	Pophers-Koury
11	Texark-Kaufman
12	Laneville-Nahatche-Hannahatchee

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1991



INDEX TO MAP SHEETS

HOUSTON COUNTY, TEXAS

SOIL LEGEND

Map symbols consist of a combination of letters. The first letter is always capital and is the initial letter of the soil name. The second letter is lowercase. The third letter, when used, is a capital letter that indicates slope. Symbols without a slope letter are for nearly level soils or for miscellaneous areas.

SYMBOL	NAME
AaB	Alazan very fine sandy loam, 0 to 2 percent slopes
AbA	Alazan-Besner complex, 0 to 2 percent slopes
AfB	Alto fine sandy loam, 1 to 3 percent slopes
AnA	Annona loam, 0 to1 percent slopes
AnB	Annona loam, 1 to 3 percent slopes
AtB	Attoyac fine sandy loam, 1 to 3 percent slopes
AuB	Austonio fine sandy loam, 1 to 3 percent slopes
AuD	Austonio fine sandy loam, 5 to 15 percent slopes
BaB	Bernaldo find sandy loam, 1 to 3 percent slopes
BbA	Bernaldo-Besner complex, 0 to 2 percent slopes
BeA	Besner fine sandy loam, 0 to 2 percent slopes
BtC	Betis loamy fine sand, 1 to 5 percent slopes
BwB	Bowie fine sandy loam, 1 to 3 percent slopes
ChA	Chireno loam, 0 to 1 percent slopes
CtE	Cuthbert fine sandy loam, 5 to 15 percent slopes
CtG	Cuthbert fine sandy loam, 15 to 35 percent slopes
CuE	Cuthbert gravelly fine sandy loam, 5 to 15 percent slopes
DaC	Darco loamy fine sand, 1 to 8 percent slopes
DaE	Darco loamy fine sand, 8 to 15 percent slopes
EaA	Eastham clay, 0 to 1 percent slopes
EaB	Eastham clay, 1 to 3 percent slopes
ErB	Elrose fine sandy loam, 1 to 3 percent slopes
EtB	Etoile loam, 1 to 3 percent slopes
FrB	Freestone fine sandy loam, 1 to 3 percent slopes
FsA	Freestone-Derly complex, 0 to 2 percent slopes
FuA	Fuller fine sandy loam, 0 to 1 percent slopes
FuB	Fuller fine sandy loam, 1 to 3 percent slopes
GaA	Garner clay, 0 to 1 percent slopes
GrB	Grapeland fine sand, 1 to 4 percent slopes
HaA	Hainesville fine sand, 0 to 2 percent slopes
HbC	Hallsbluff clay loam, 2 to 5 percent slopes
Hc	Hannahatchee fine sandy loam, frequently flooded
HeA	Herty loam, 0 to 1 percent slopes
HeB	Herty loam, 1 to 3 percent slopes
Iu	Iulus fine sandy loam, frequently flooded
Ka	Kaufman clay, occasionally flooded
Kb	Kaufman clay, frequently flooded
KcE	Kellison loam, 5 to 15 percent slopes
KeB	Keltys fine sandy loam, 1 to 3 percent slopes
KeD	Keltys fine sandy loam, 5 to 8 percent slopes
KfC	Kirvin fine sandy loam, 2 to 5 percent slopes

SYMBOL	NAME
KgC	Kirvin gravelly fine sandy loam, 2 to 5 percent slopes
KhC	Kirvin soils, graded, 2 to 8 percent slopes
Ko	Kosse sandy clay loam, occasionally flooded
Kp	Koury silt loam, frequently flooded
KuB	Kurth fine sandy loam 1 to 3 percent slopes
KuD	Kurth find sandy loam, 5 to 8 percent slopes
LaA	LaCerda clay loam, 0 to 1 percent slopes
LaB	LaCerda clay loam, 1 to 3 percent slopes
LaE	LaCerda clay loam, 5 to 15 percent slopes
Lc	Laneville loam, frequently flooded
LeB	Latex loam, 1 to 3 percent slopes
LtC	Lilbert loamy fine sand, 2 to 5 percent slopes
LvC	Lovelady loamy sand, 1 to 5 percent slopes
LvD	Lovelady loamy sand, 5 to 8 percent slopes
MoA	Mollville loam, 0 to 1 percent slopes
MpA	Mollville-Besner complex, 0 to 2 percent slopes
MsB	Moswell loam, 1 to 3 percent slopes
MsE	Moswell loam, 5 to 15 percent slopes
MxA	Moten-Multey complex, 0 to 2 percent slopes
NaG	Naclina clay loam, 15 to 35 percent slopes, eroded
Nc	Naconiche mucky sandy loam, 0 to 2 percent slopes
Nh	Nahatche loam, frequently flooded
Oz	Ozias-Pophers complex, frequently flooded
PeB	Penning very fine sandy loam, 0 to 4 percent slopes
PnA	Percilla clay loam, 0 to 1 percent slopes
Po	Pophers silt loam, frequently flooded
PsA	Portersprings fine sandy loam, 0 to 1 percent slopes
RnB	Rentzel loamy fine sand, 0 to 4 percent slopes
SaB	Sacul fine sandy loam, 1 to 3 percent slopes
SwA	Sawlit-Latex complex, 0 to 2 percent slopes
TaE	Tenaha loamy fine sand, 5 to 15 percent slopes
Te	Texark clay, occasionally flooded
Tf	Texark clay, frequently flooded
ToC	Tonkawa fine sand, 0 to 8 percent slopes
TrE	Trawick fine sandy loam, 5 to 15 percent slopes
TwC	Trawick gravelly fine sandy loam, 2 to 5 percent slopes
TwE	Trawick gravelly fine sandy loam, 5 to 15 percent slopes
TxG	Trawick-Bub complex, 15 to 40 percent slopes
WnB	Woden fine sandy loam, 1 to 3 percent slopes
WoB	Woodtell very fine sandy loam, 1 to 3 percent slopes
WoE	Woodtell very fine sandy loam, 5 to 15 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 173
- Federal — 287
- State — 52
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (Named where applicable)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
- Double-line (label) — CANAL
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — BtC DaE

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

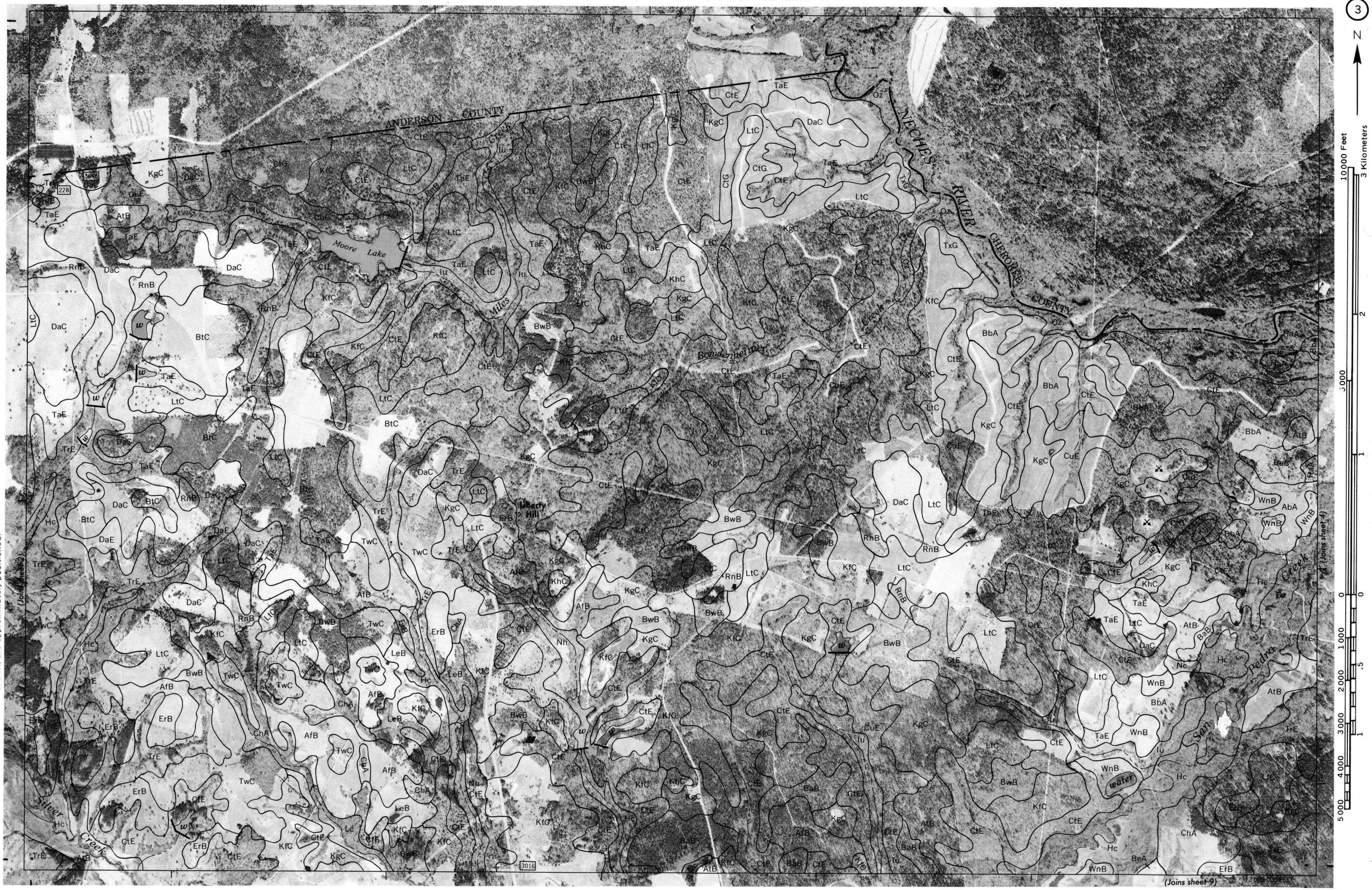
SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

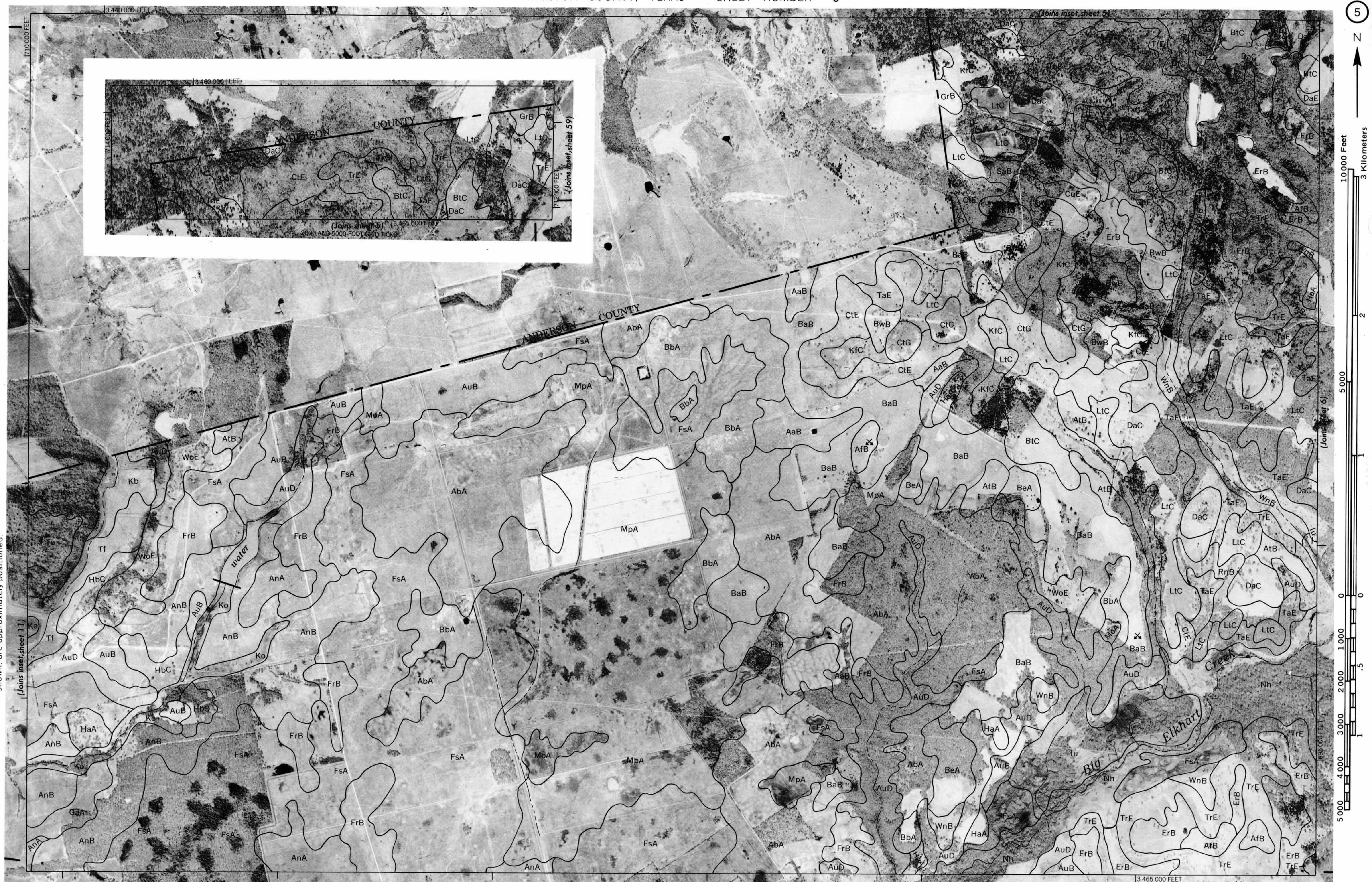
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

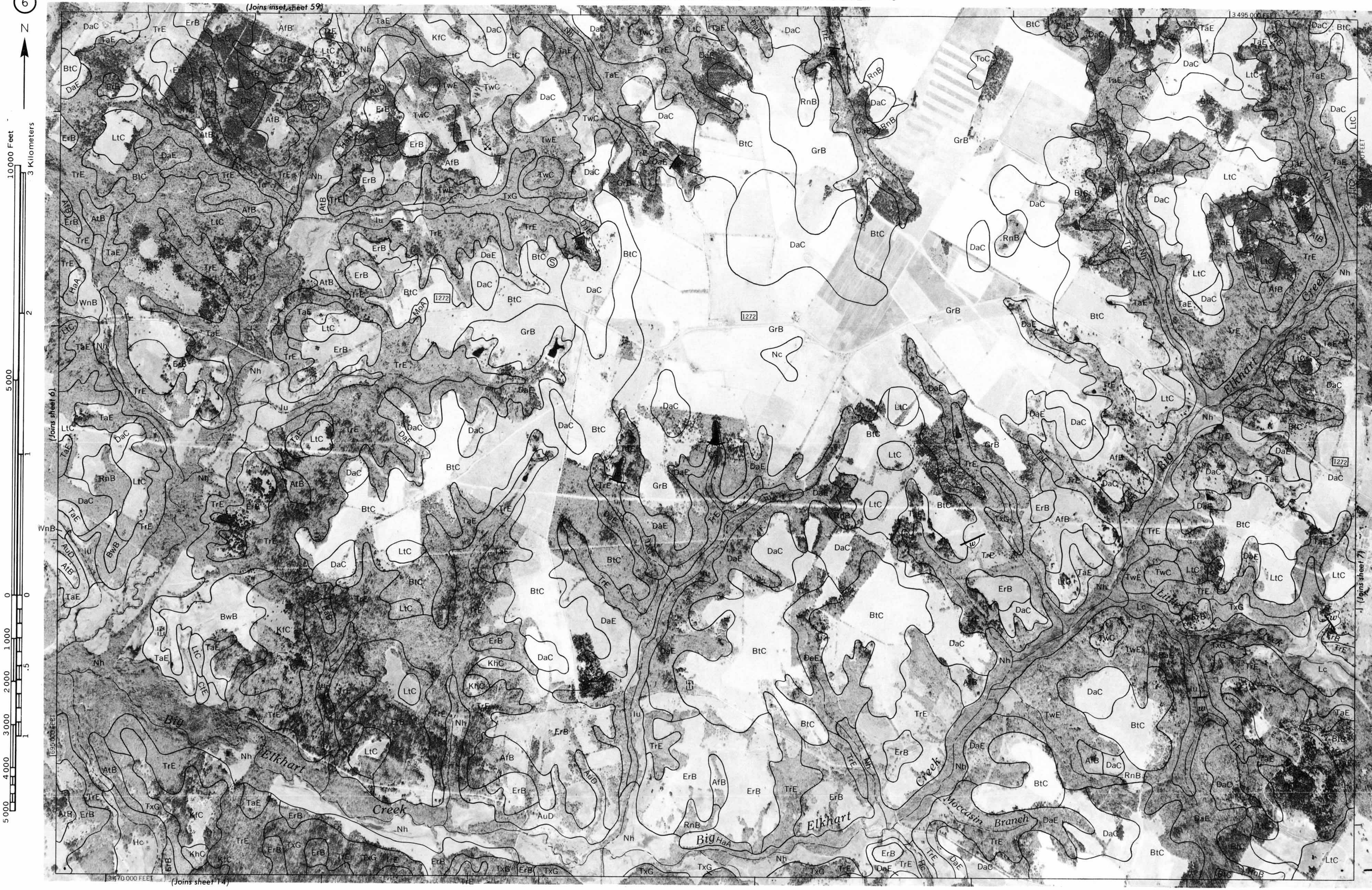


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

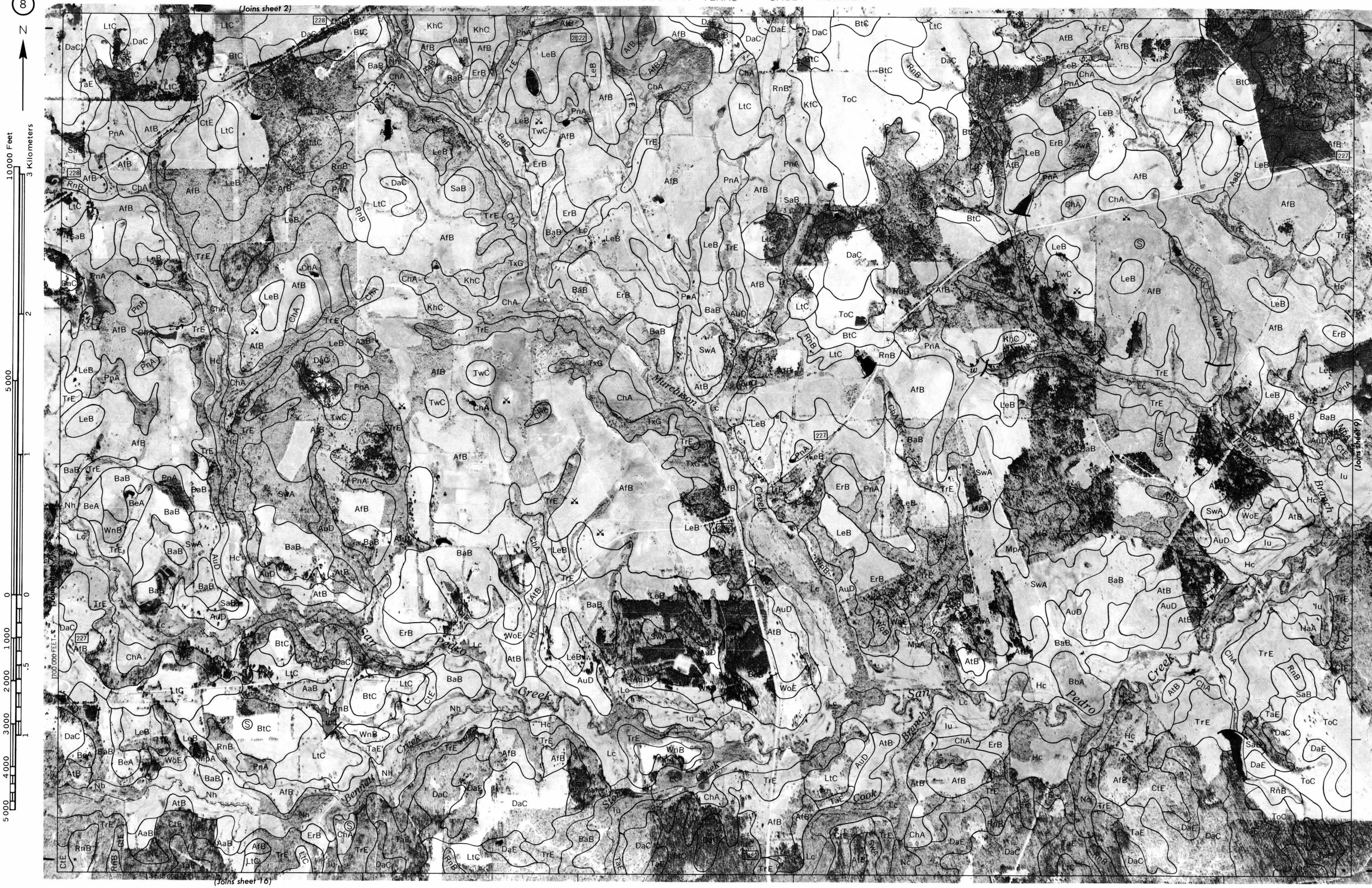
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



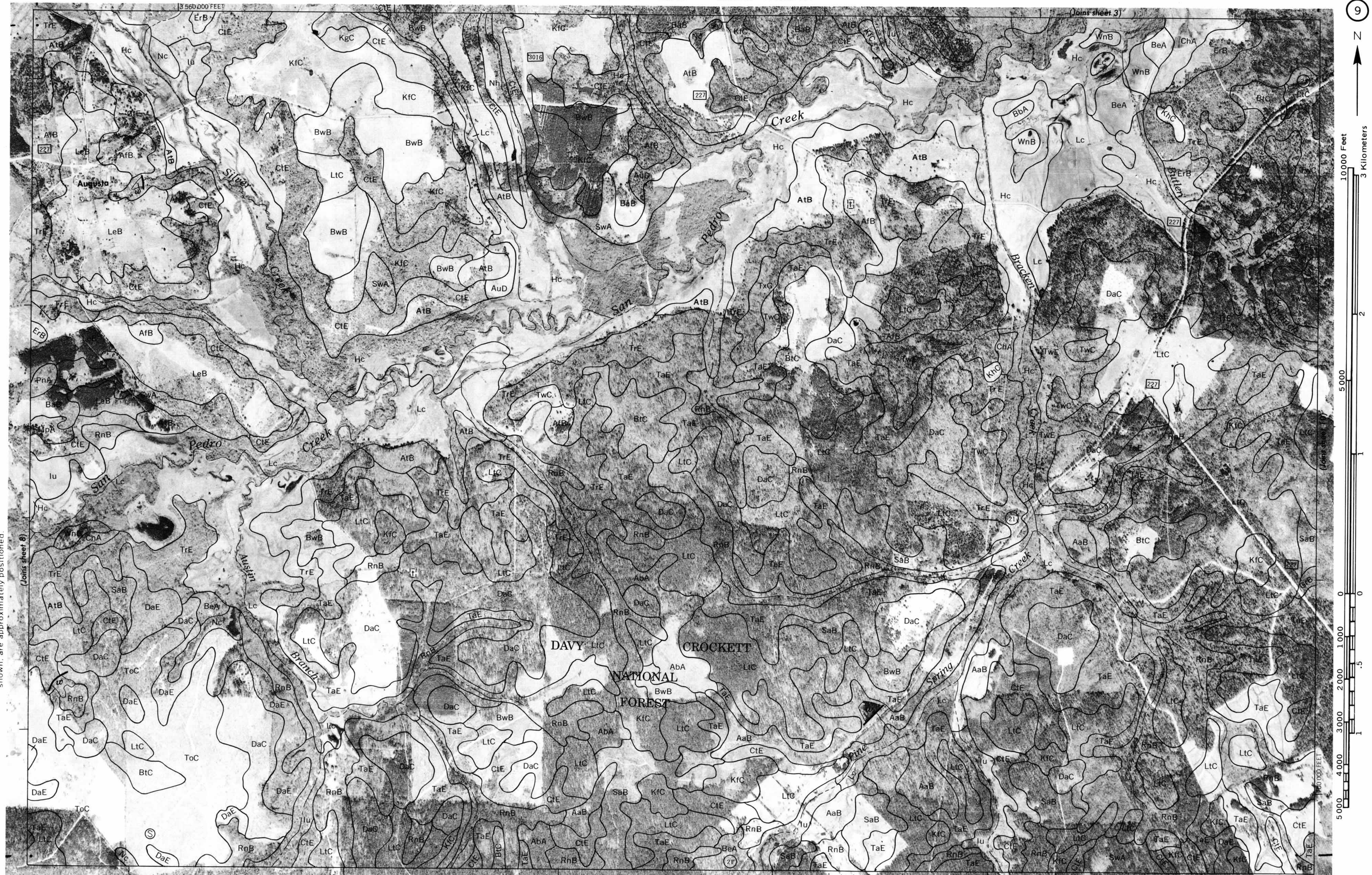


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



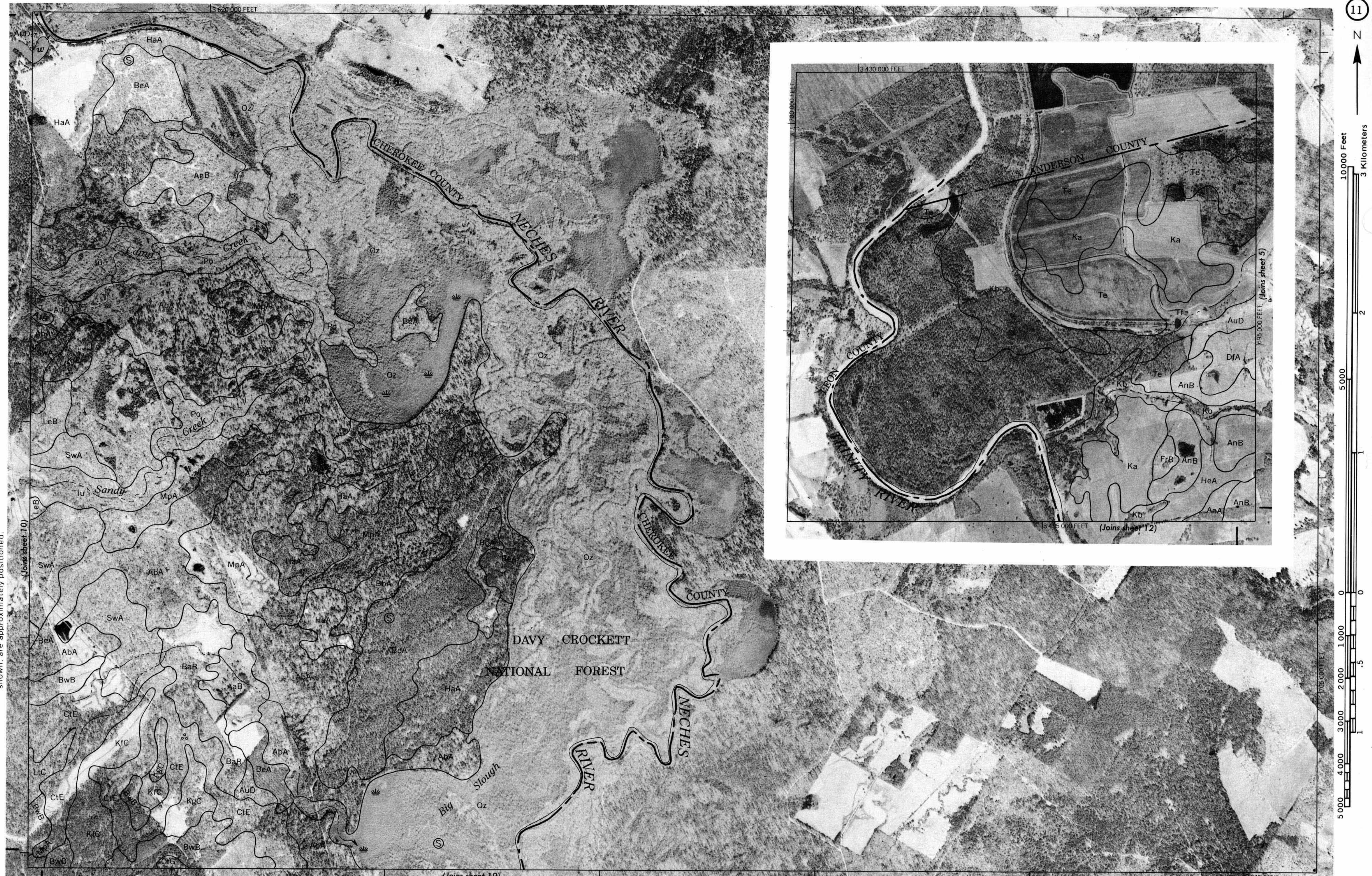
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if



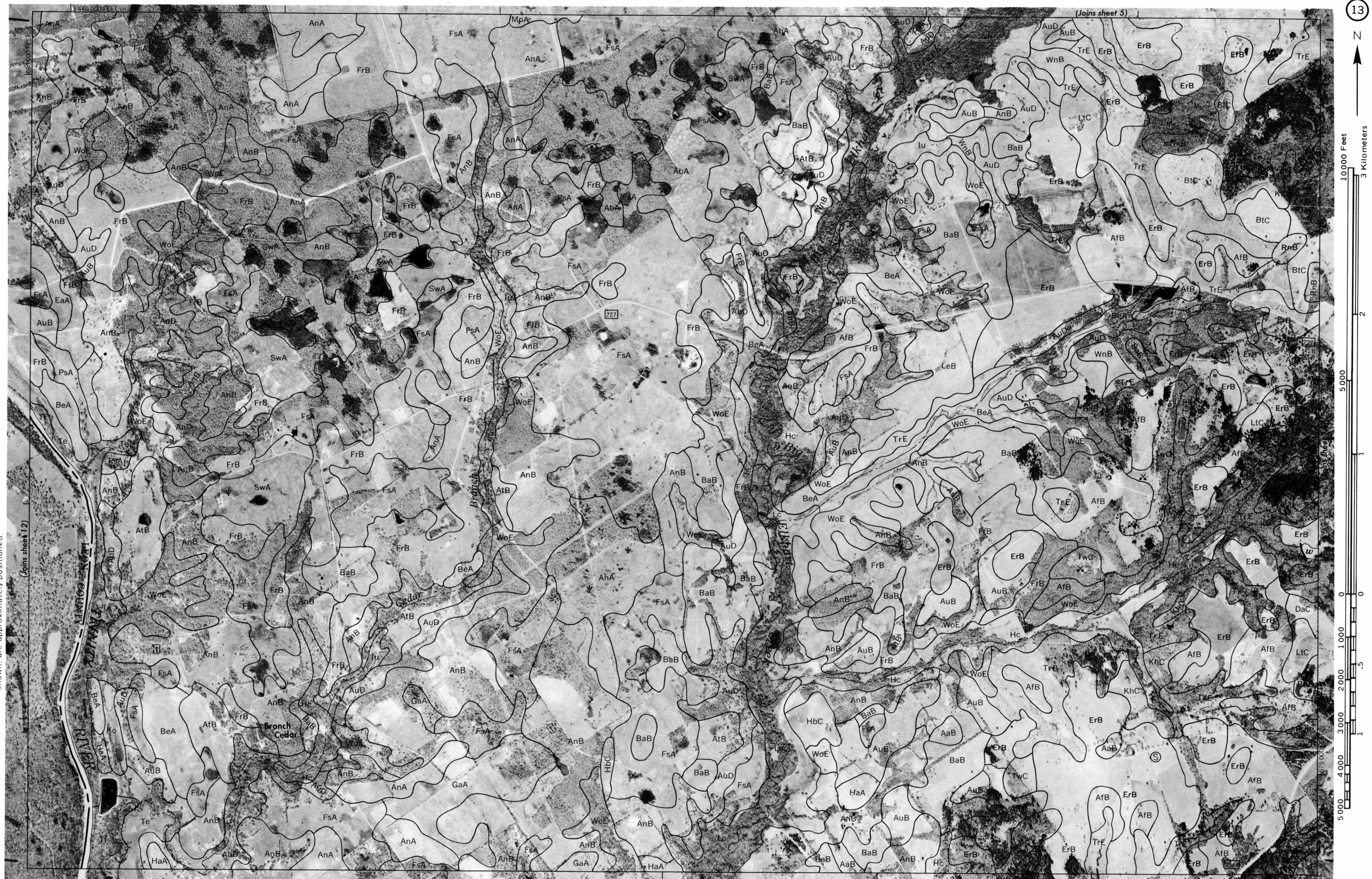
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

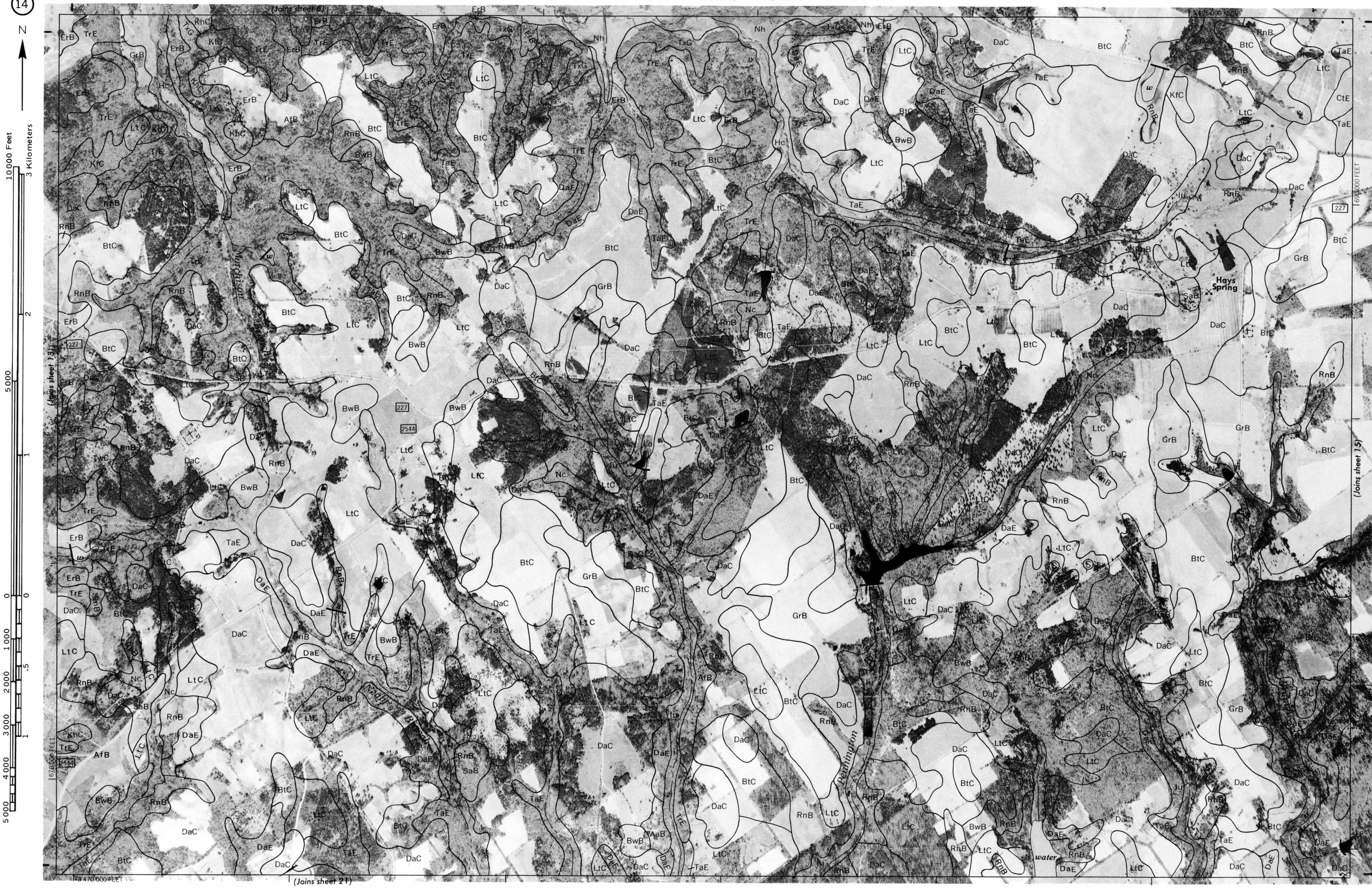
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

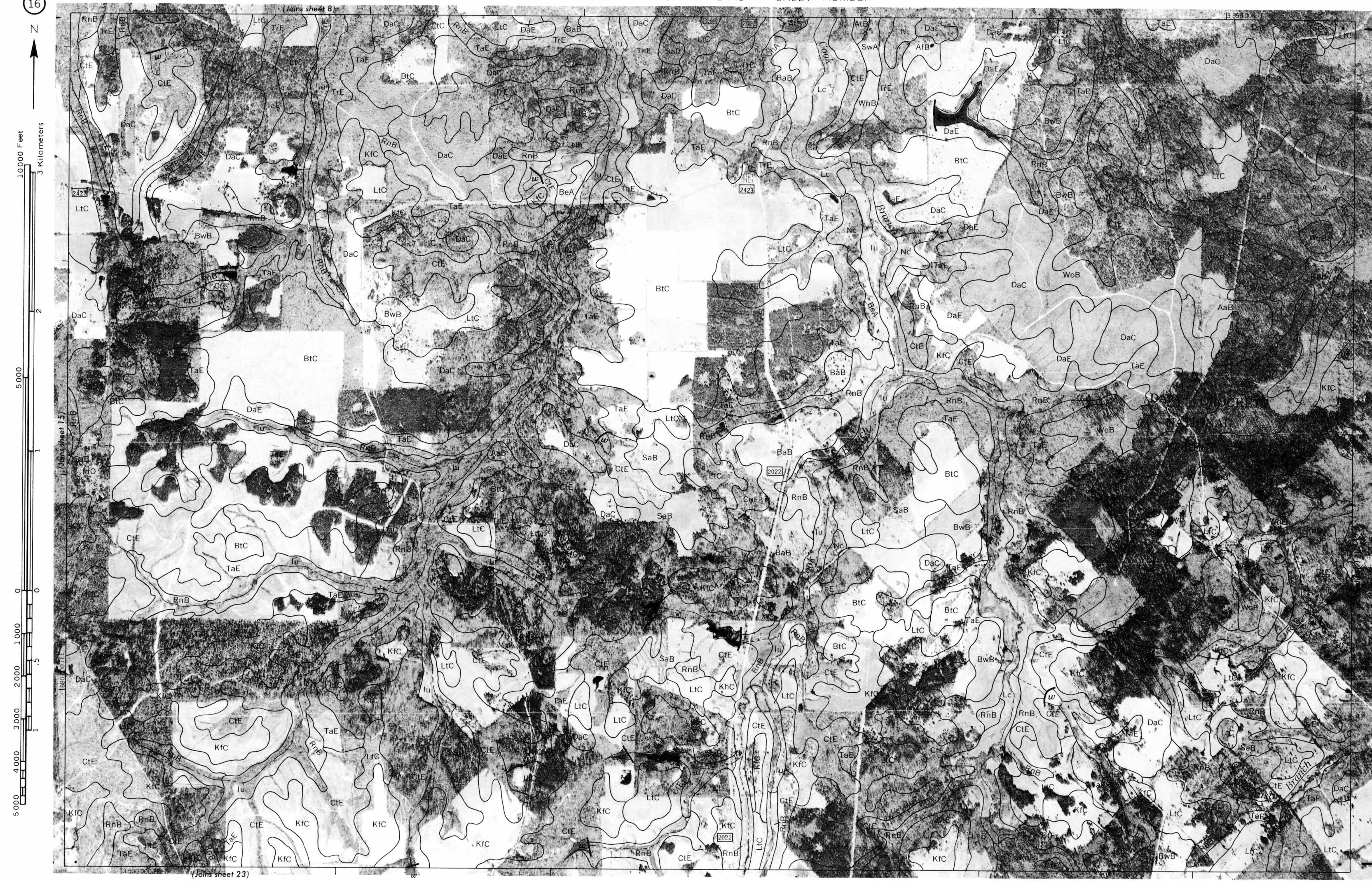


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

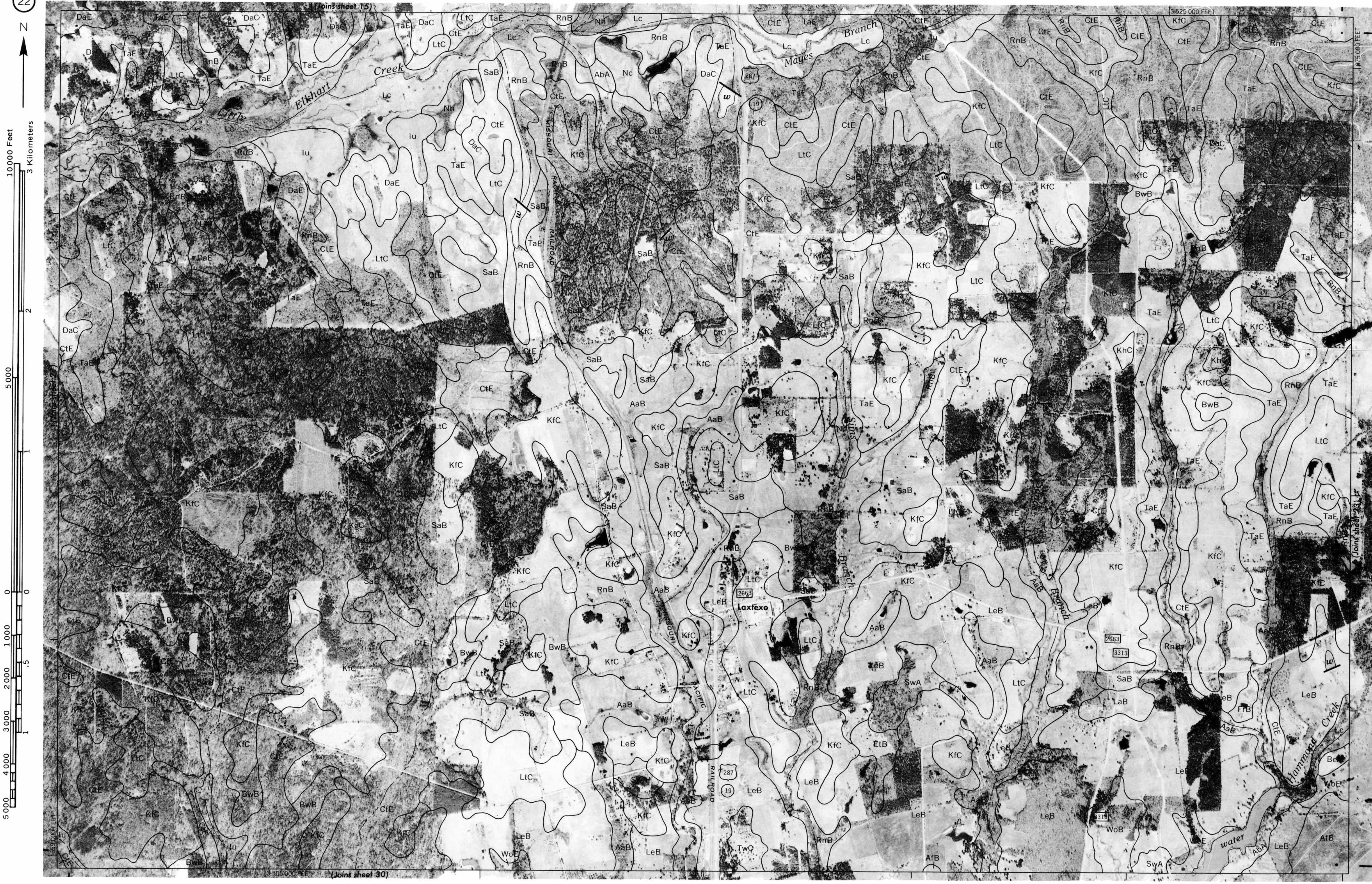
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

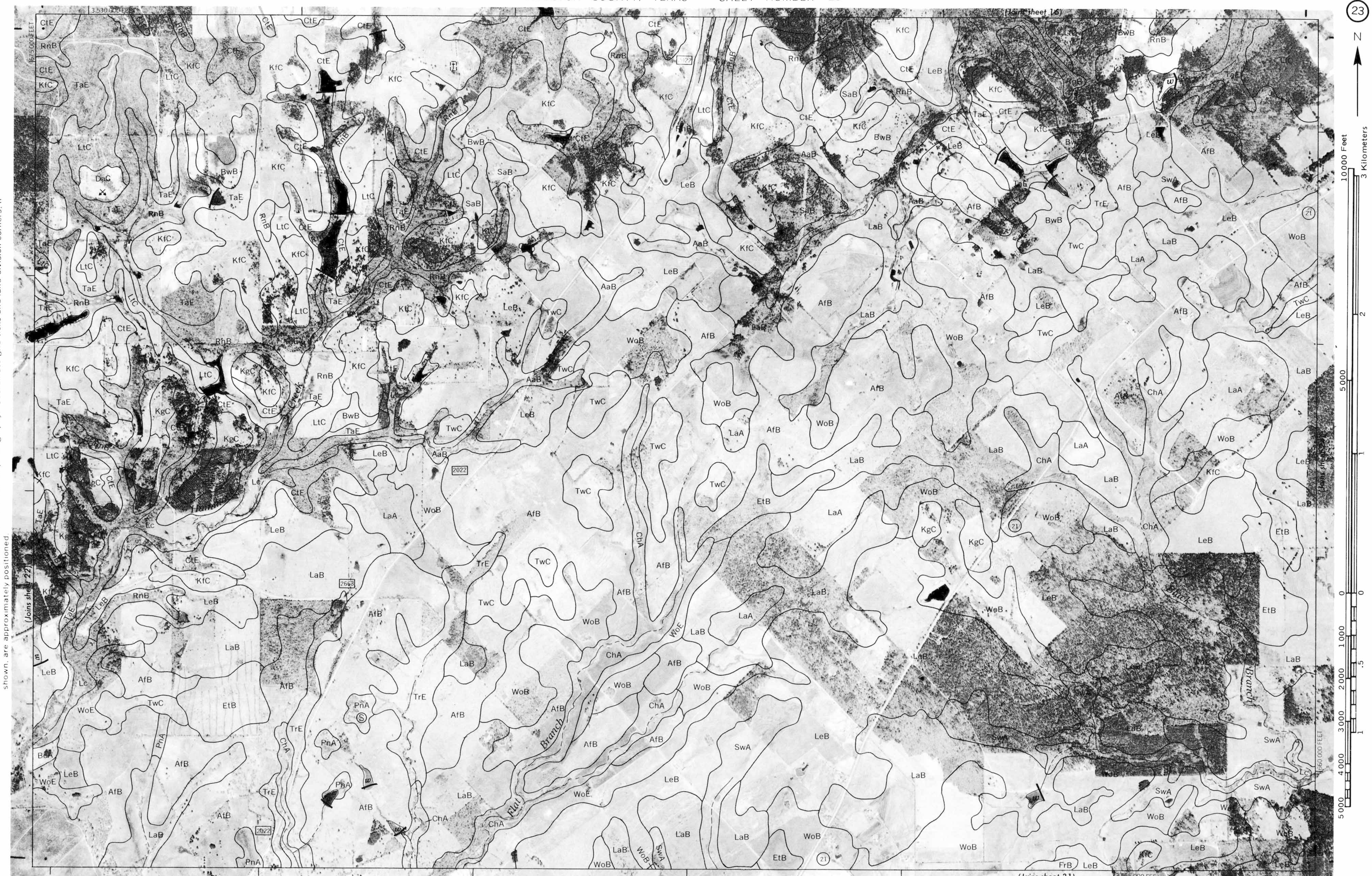
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

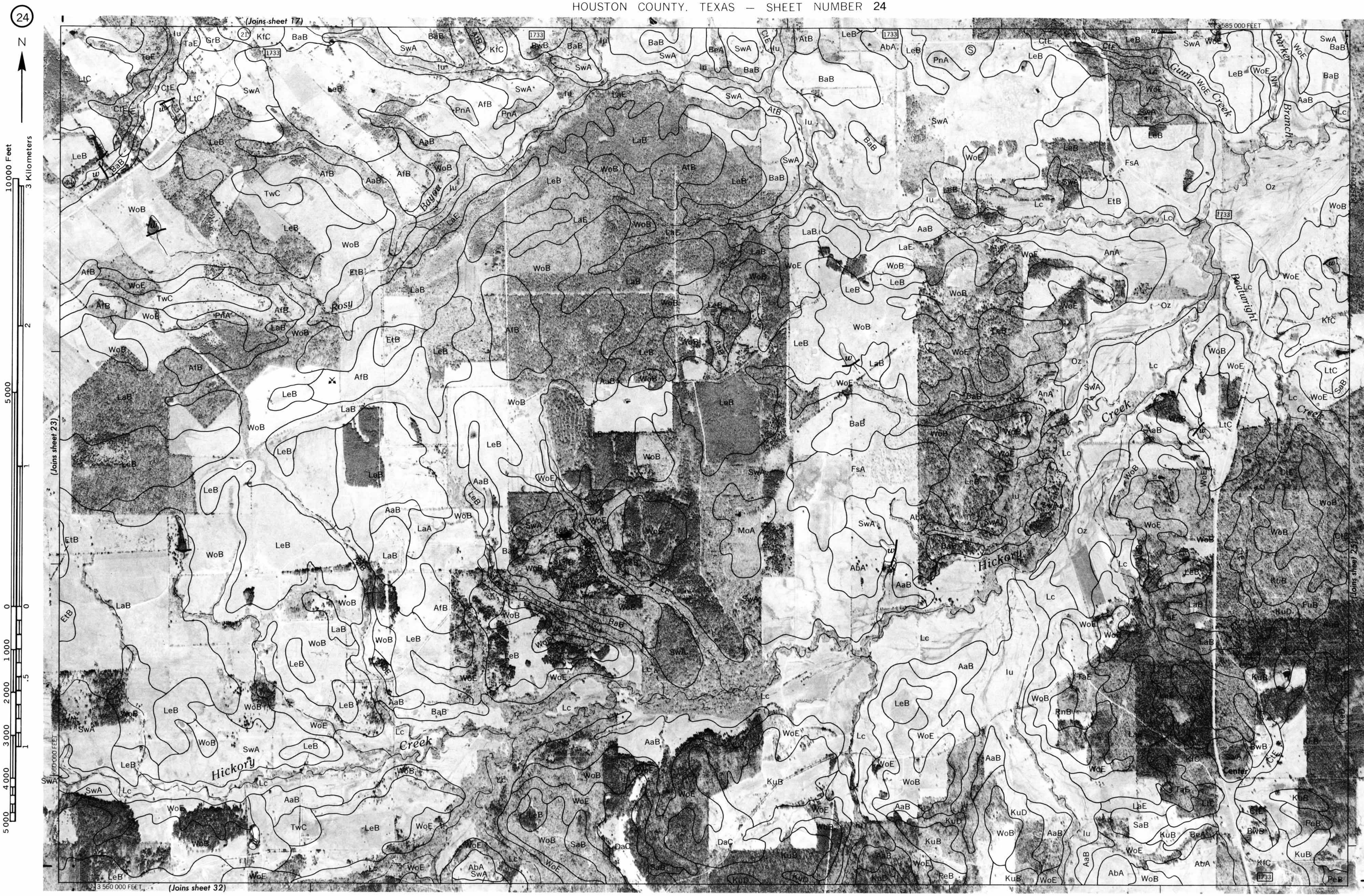
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

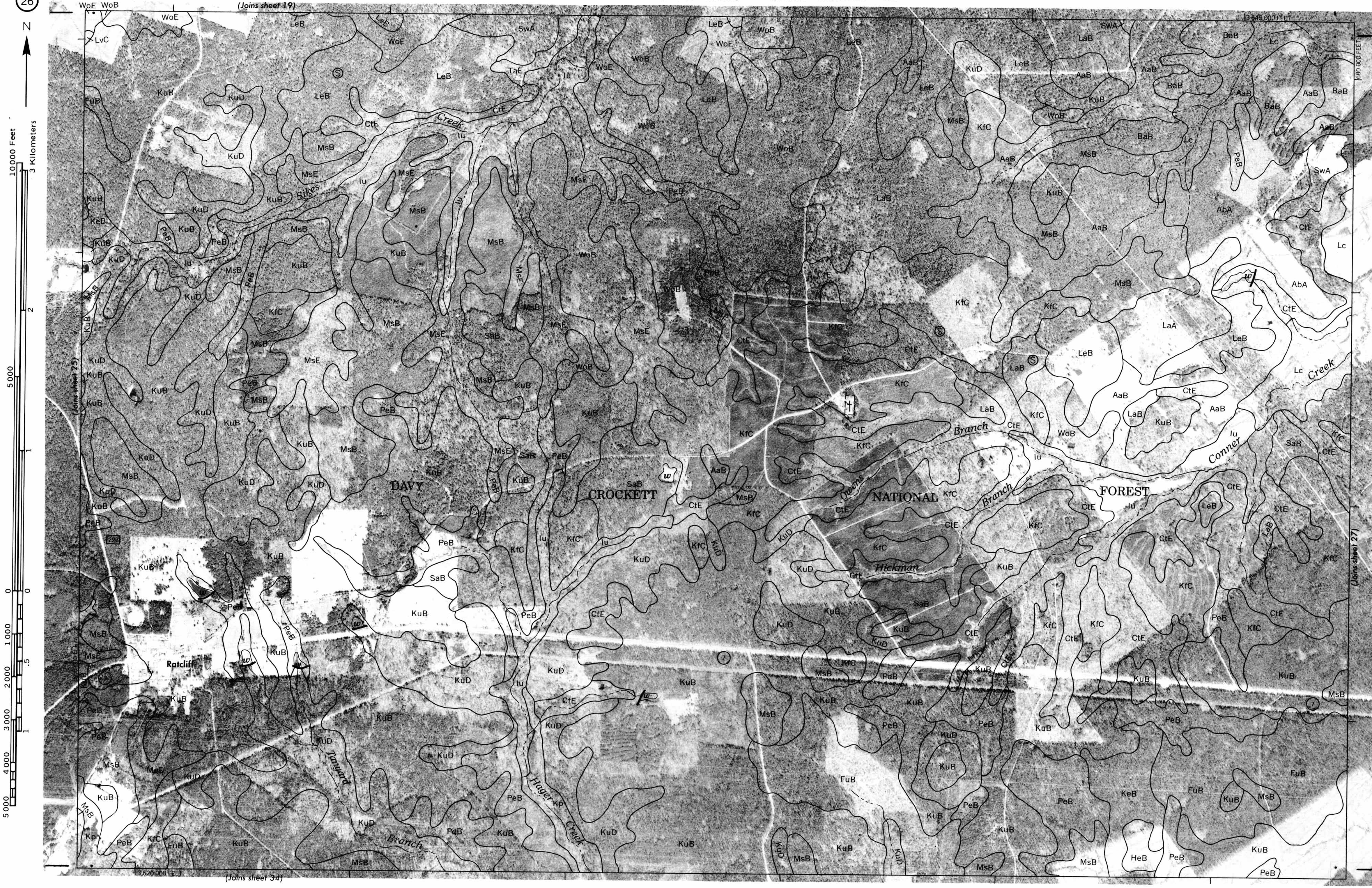


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

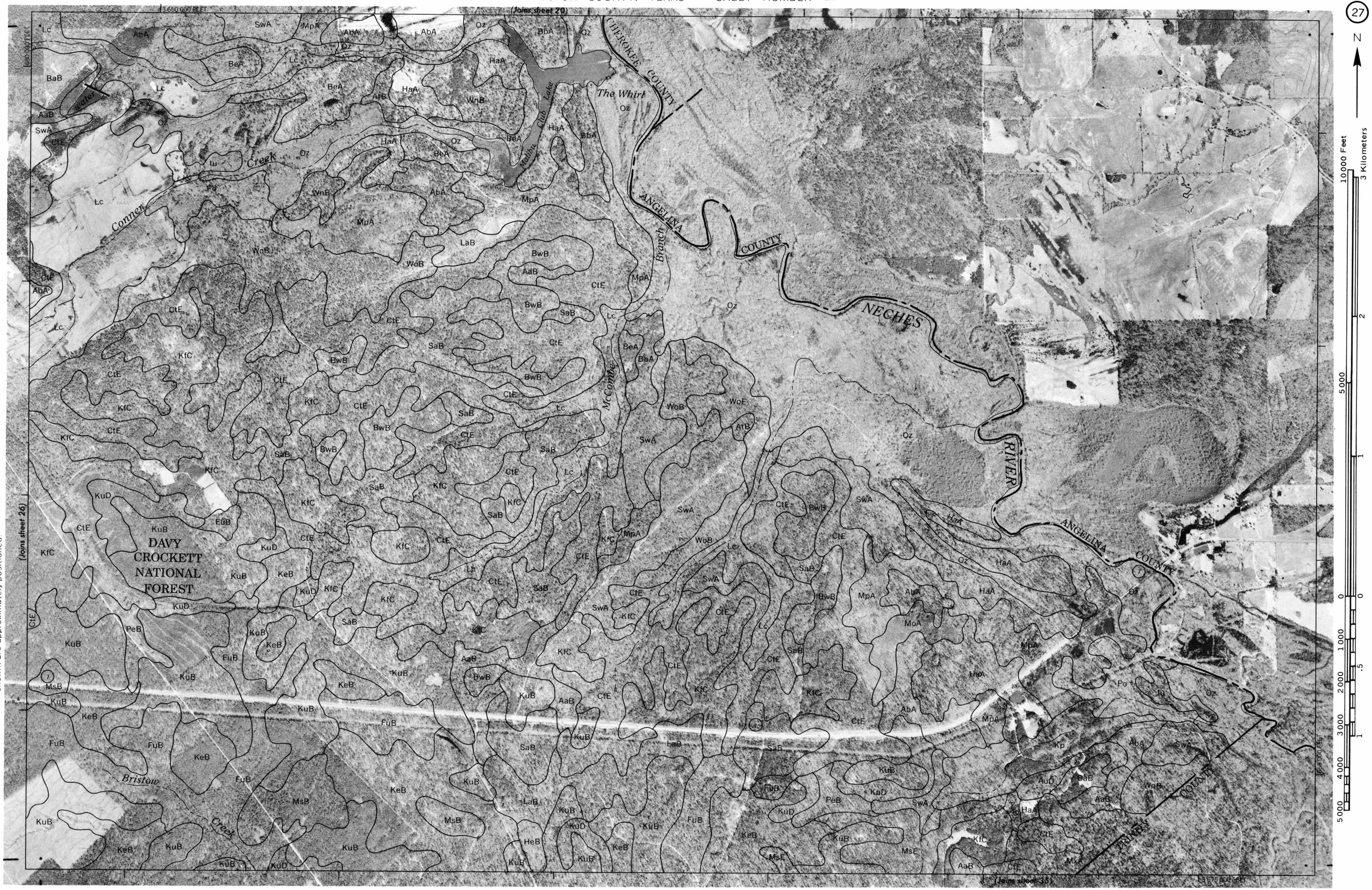


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



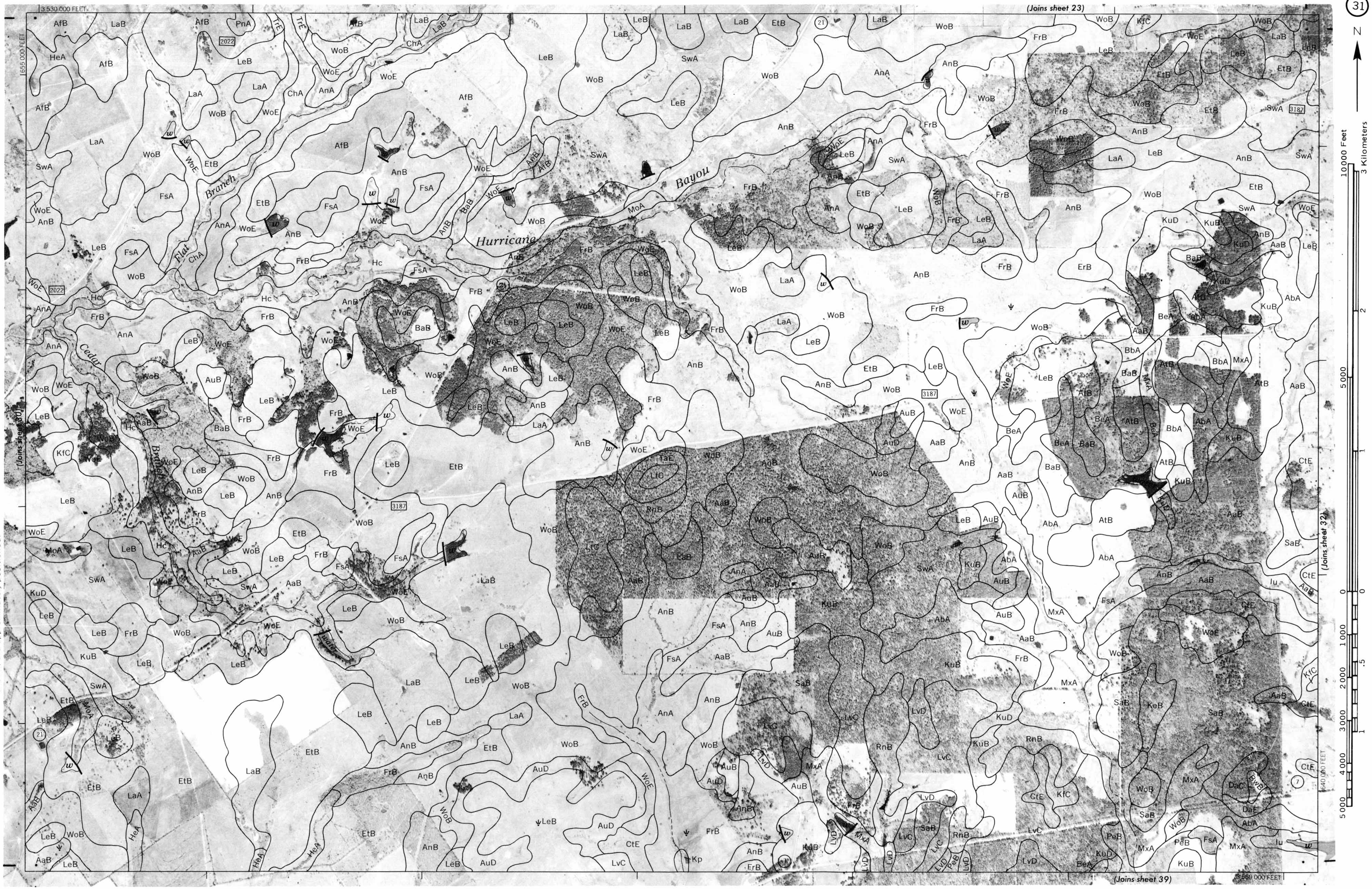
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

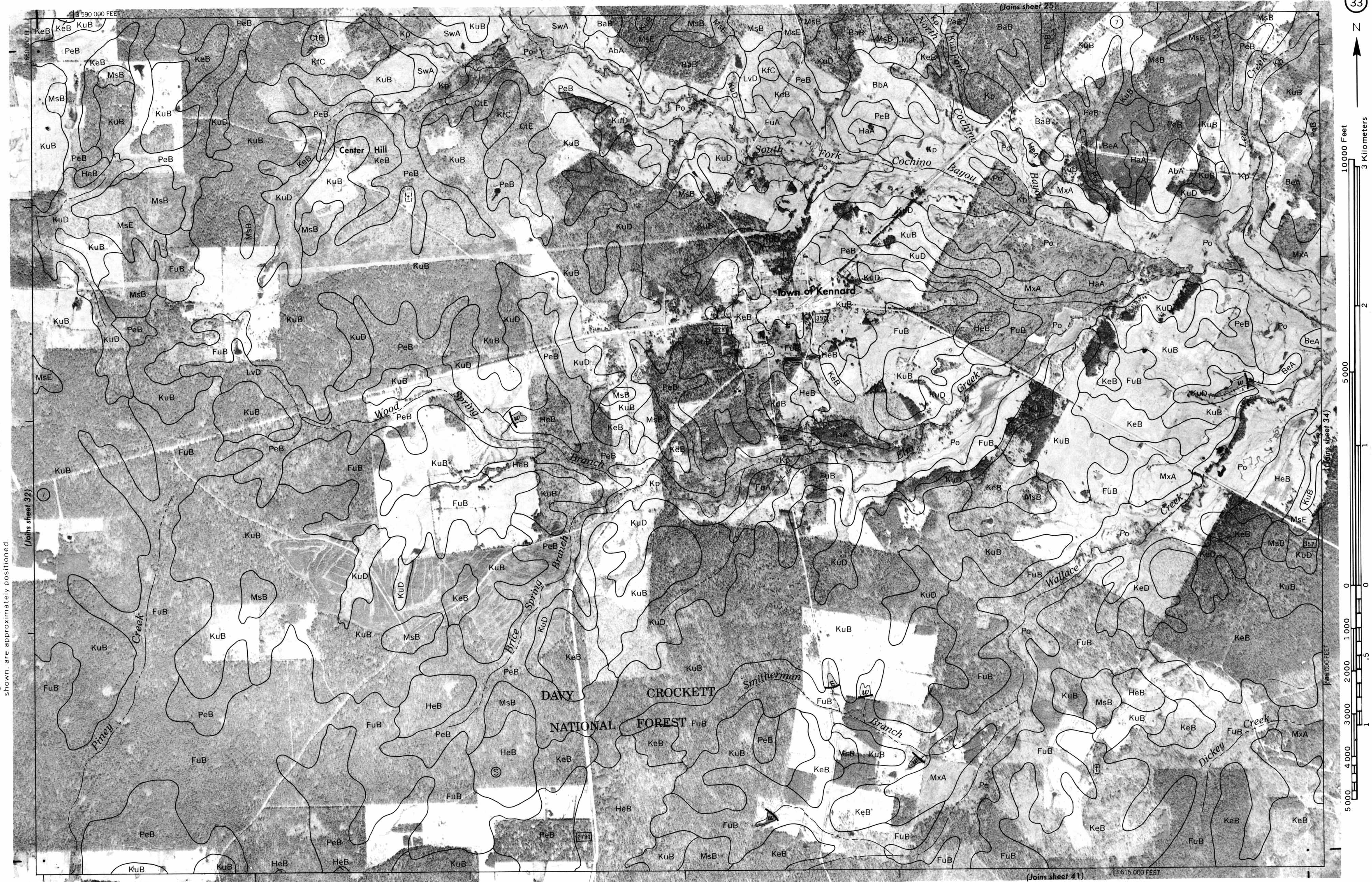
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



HOUSTON COUNTY, TEXAS — SHEET NUMBER 32

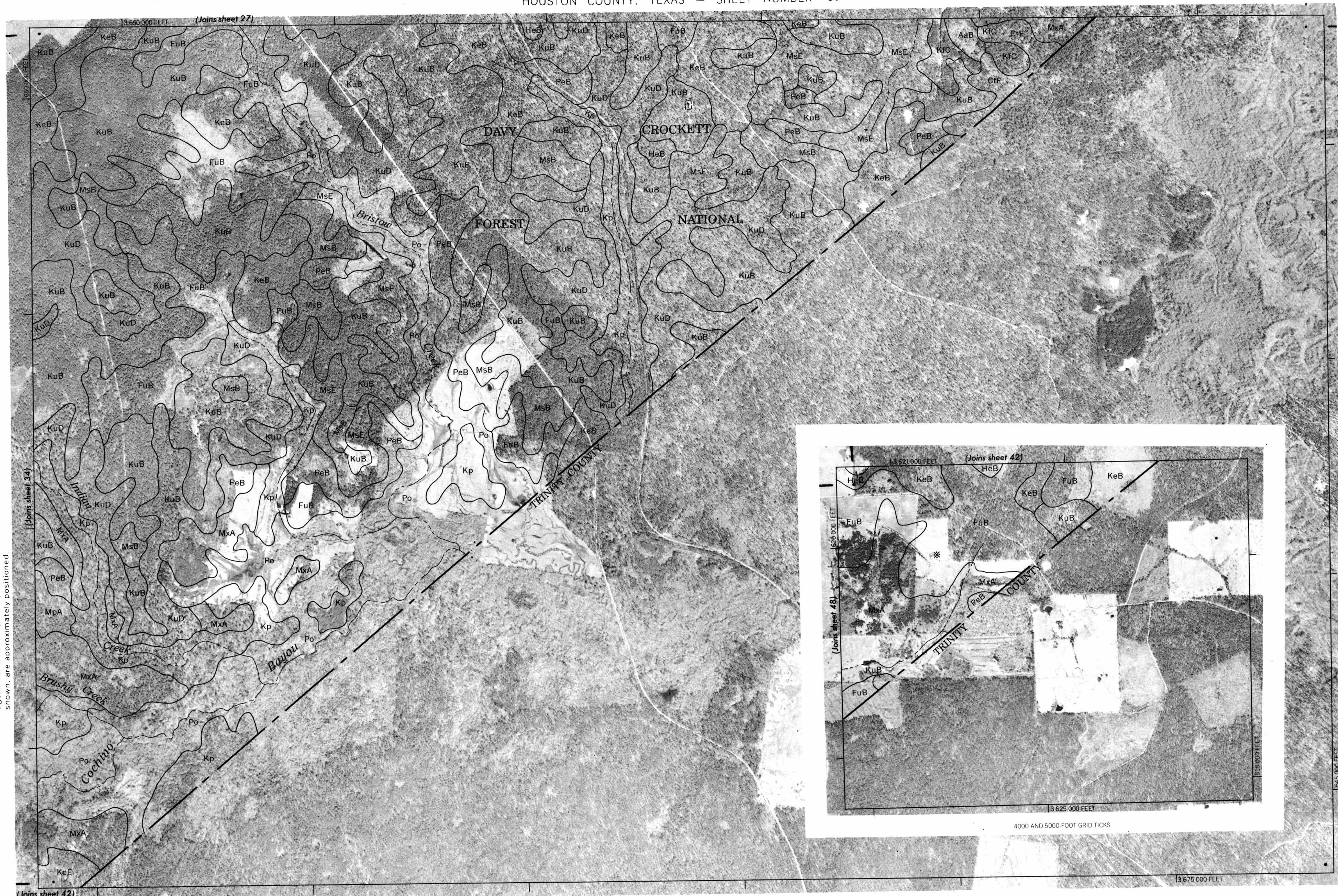
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

34

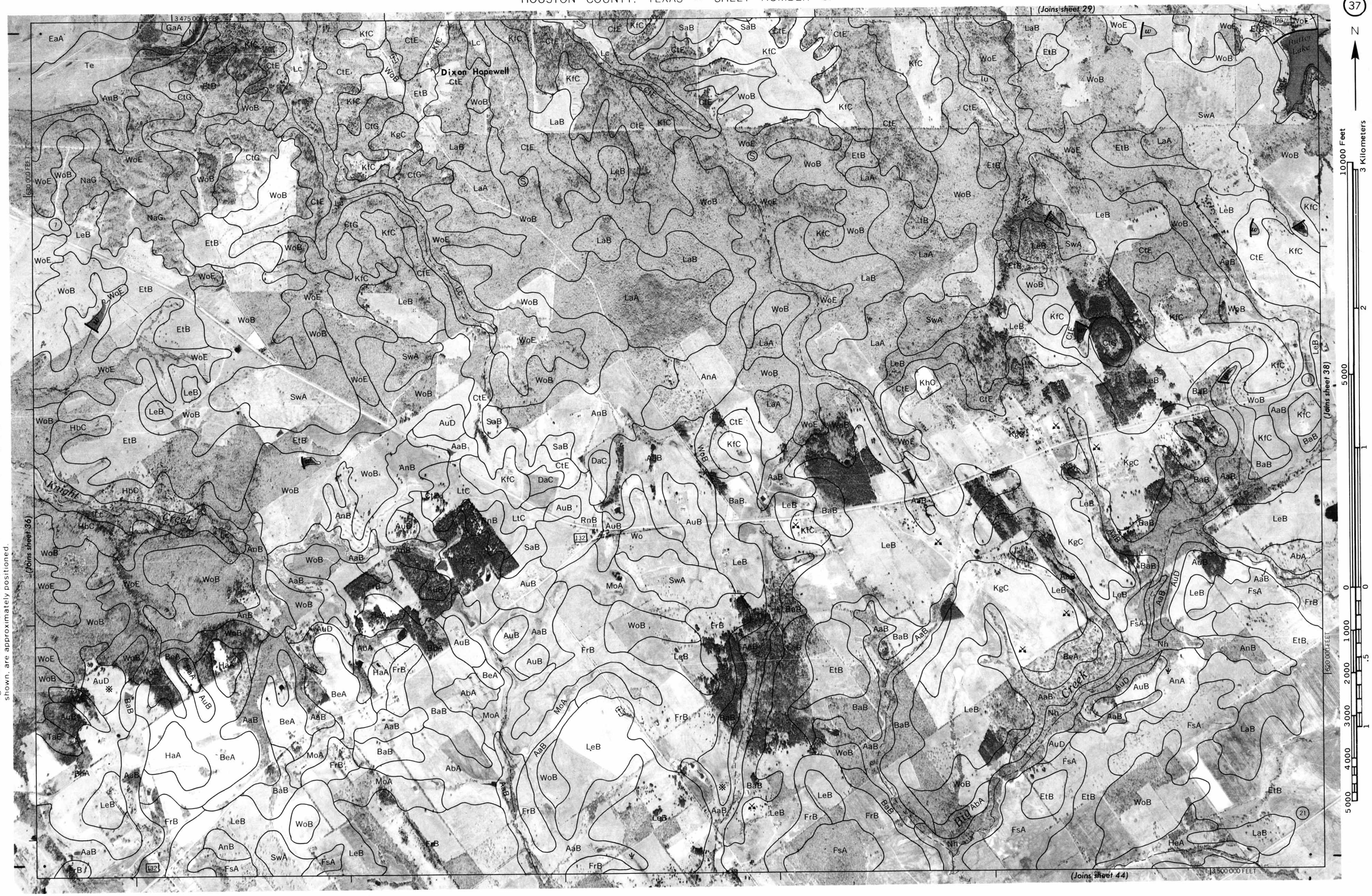
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

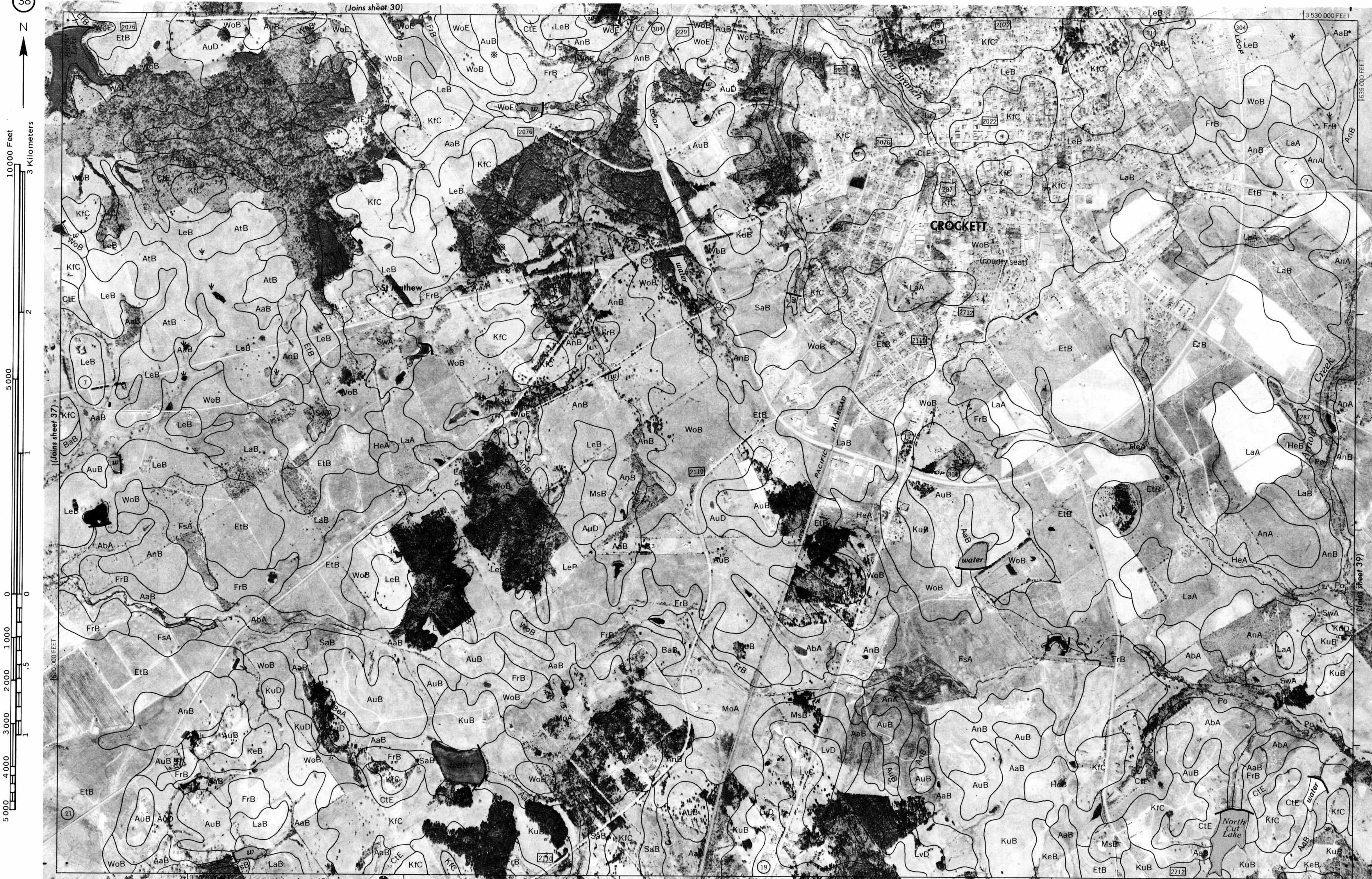


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

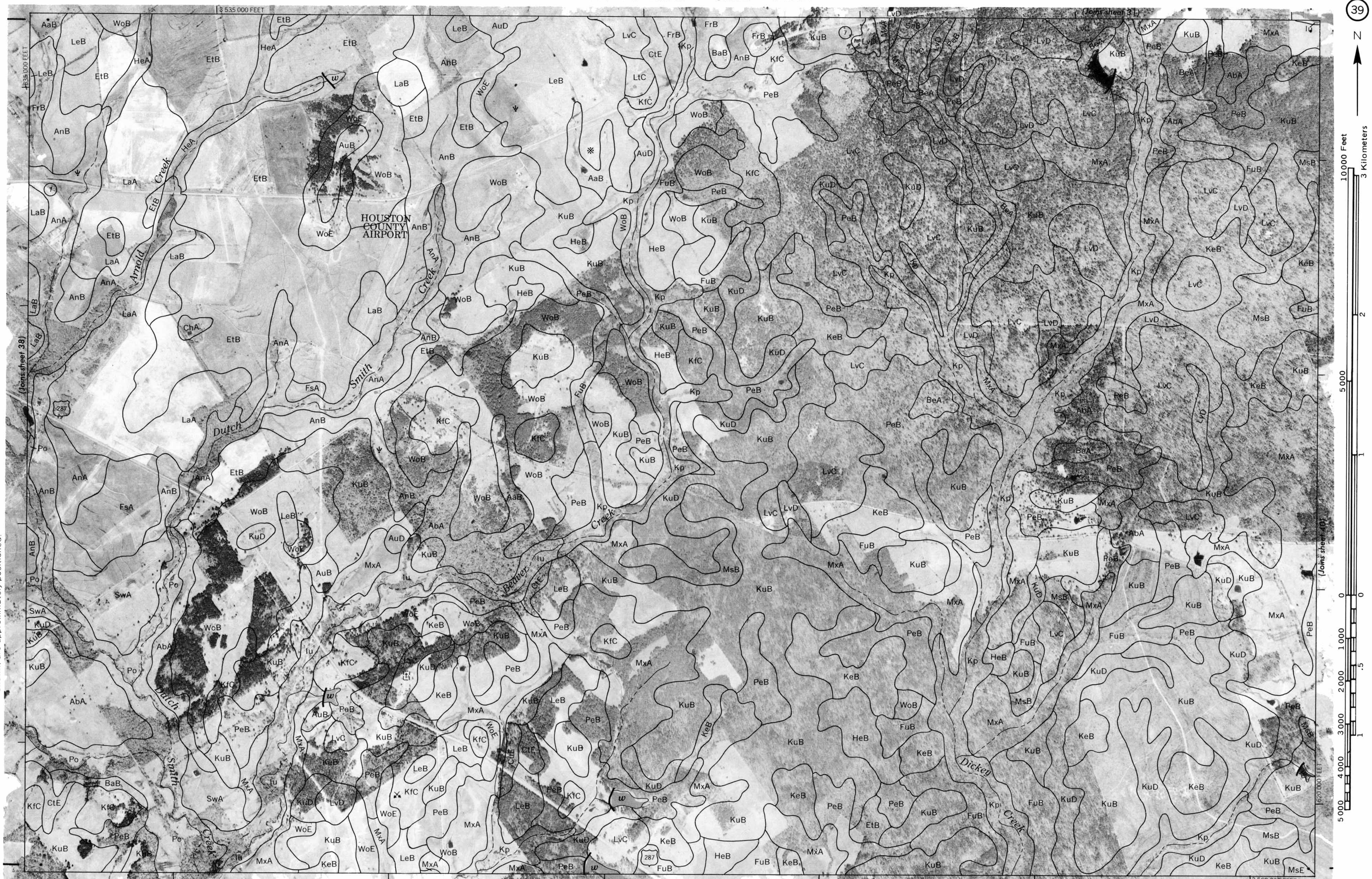
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

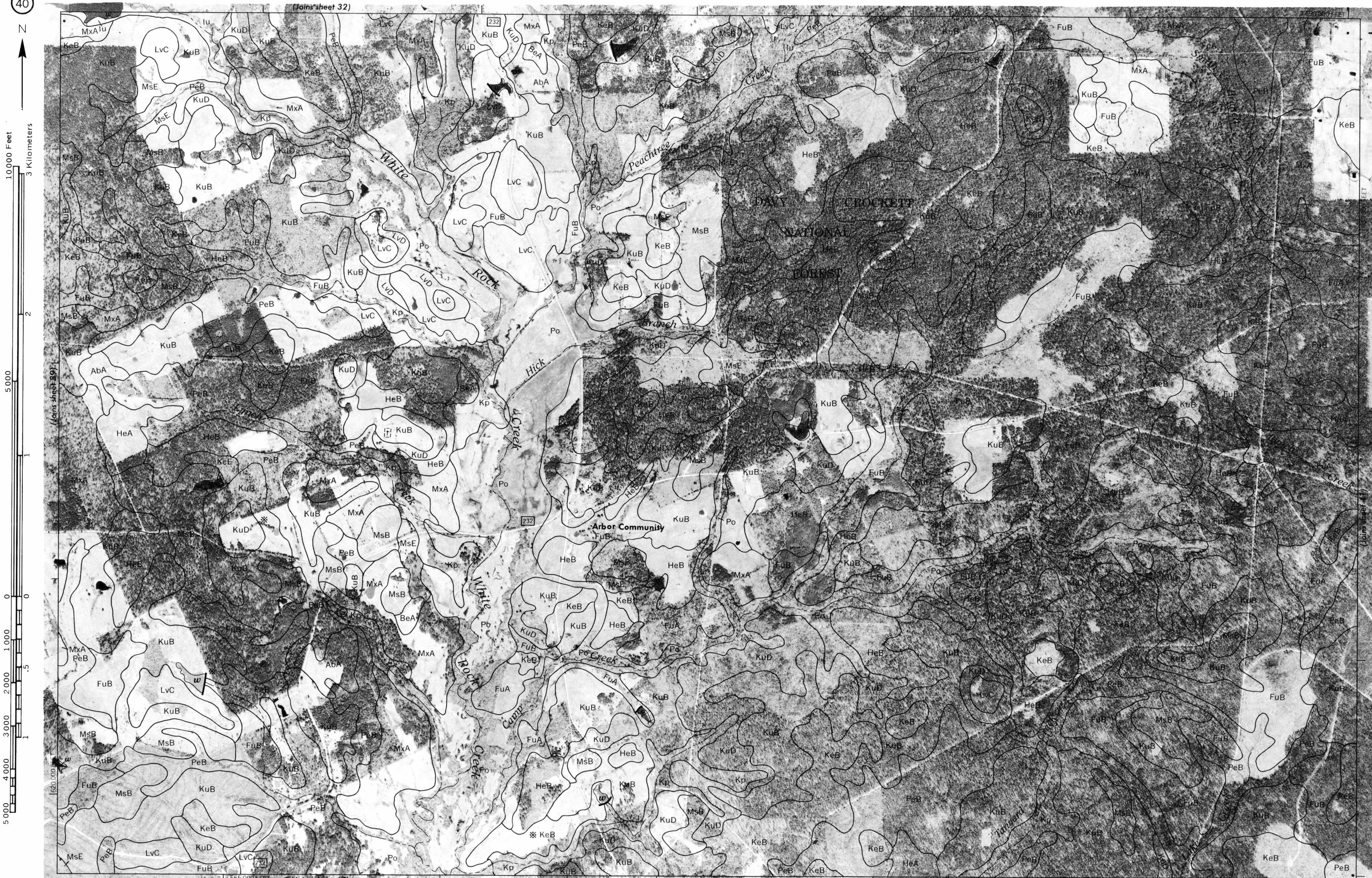




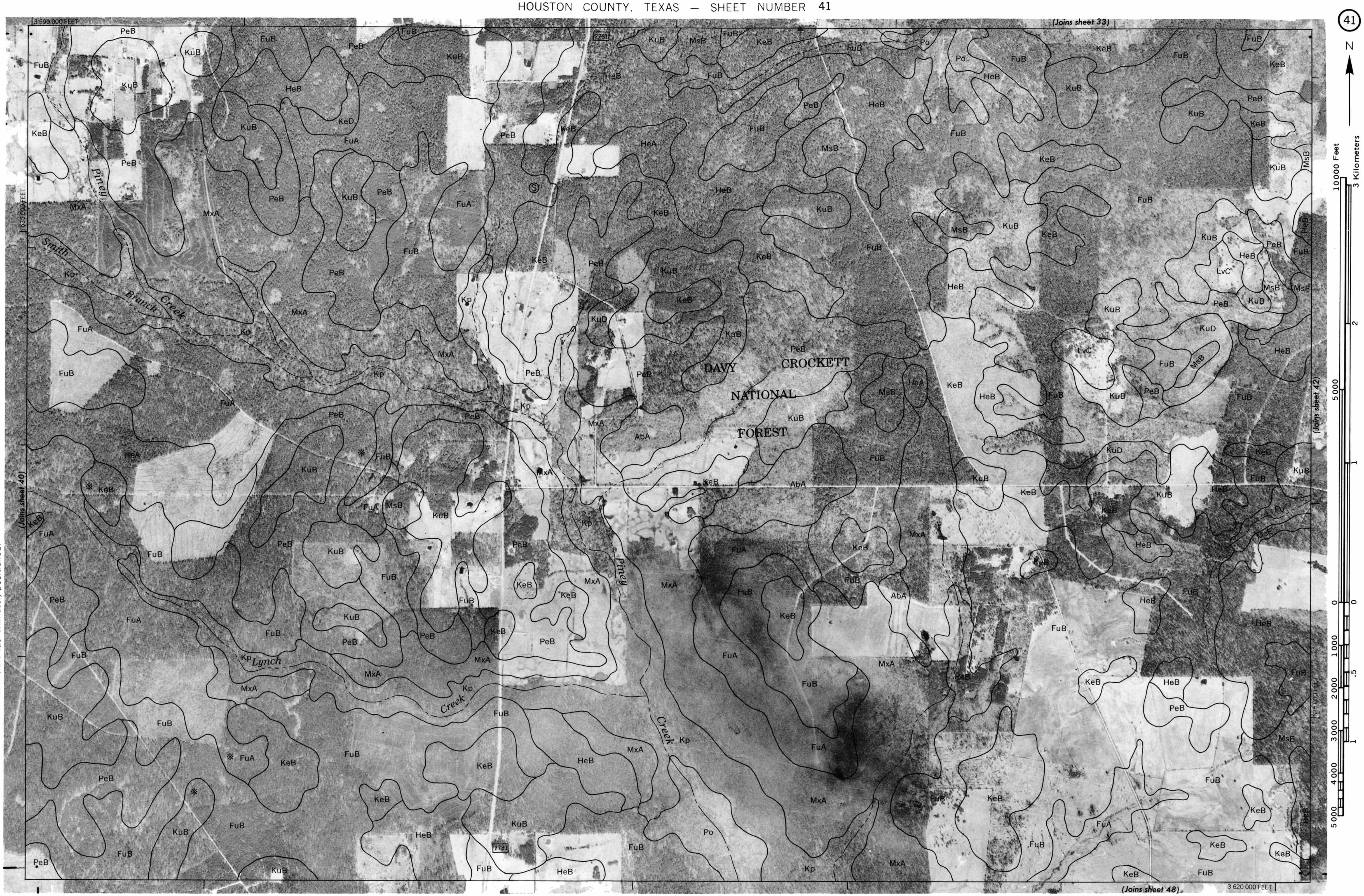
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



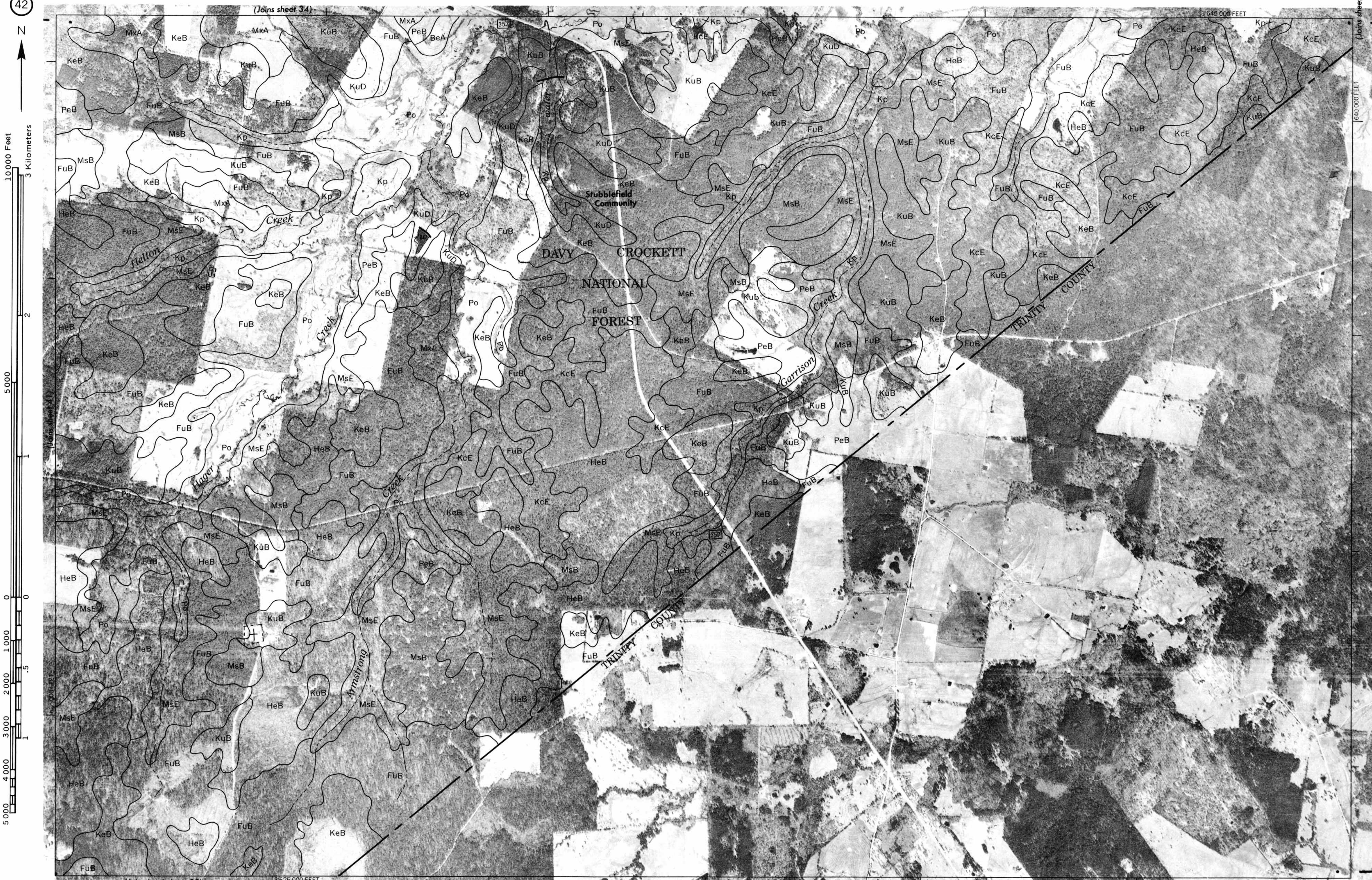
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

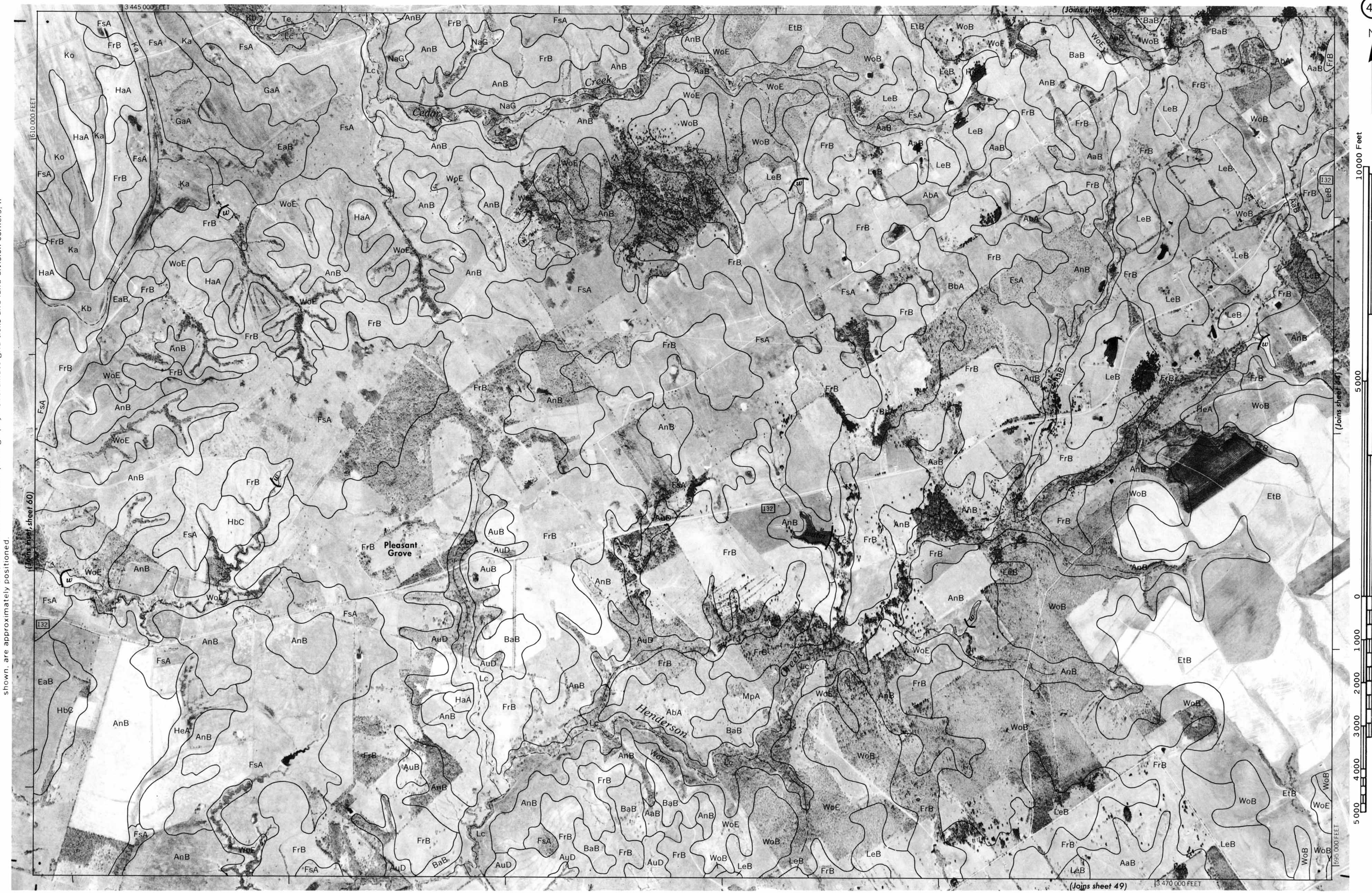


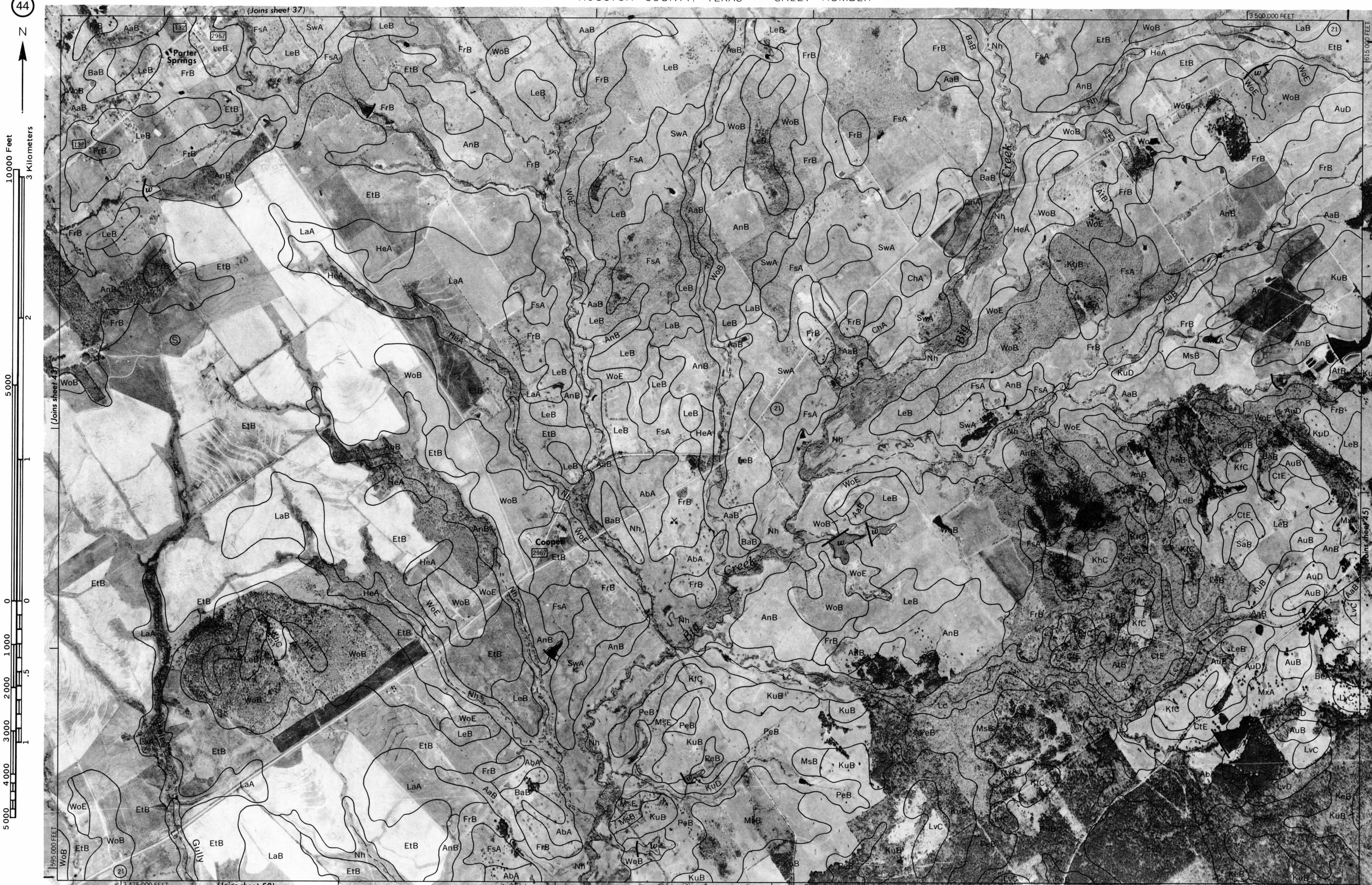
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

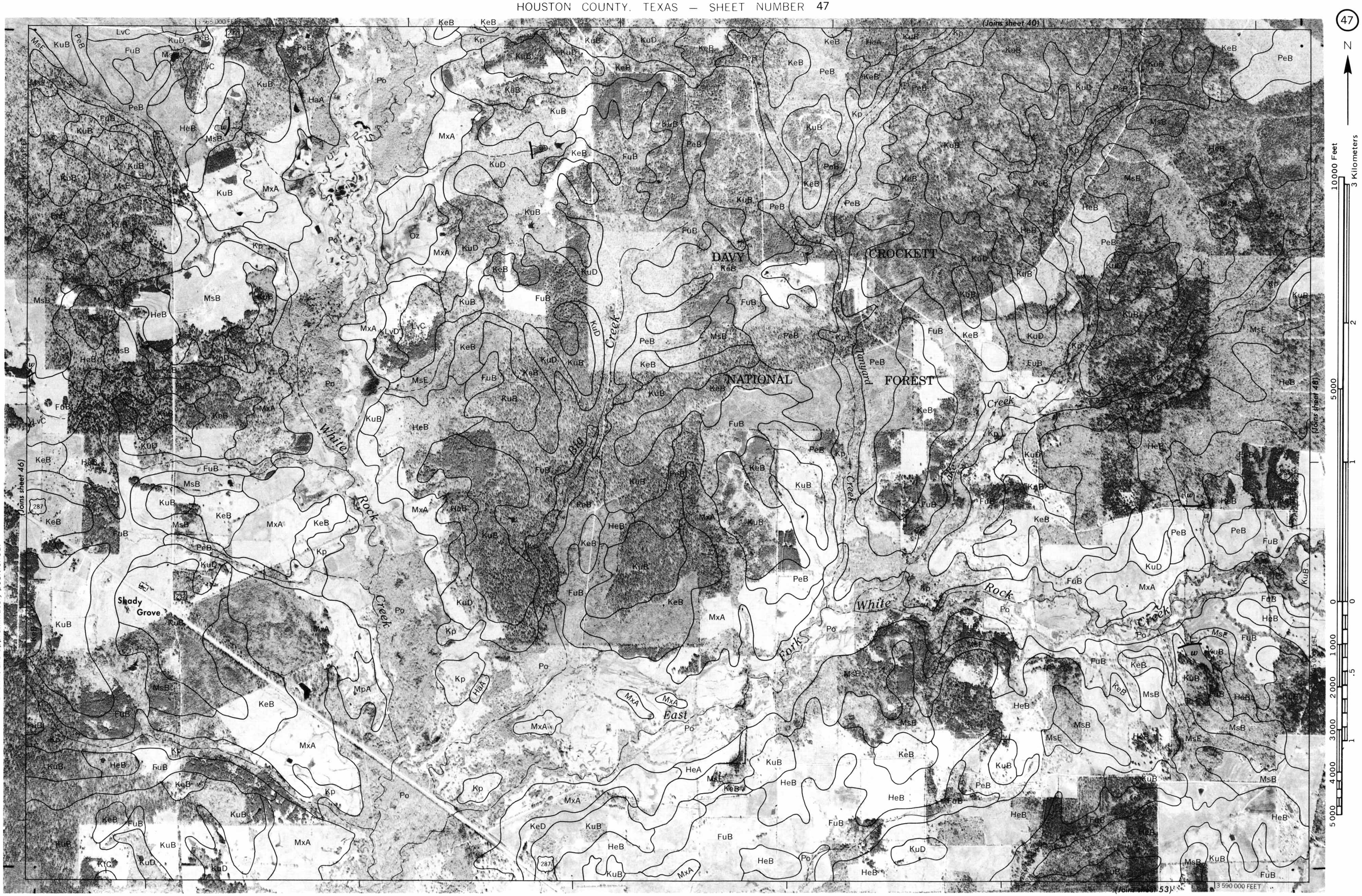




This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

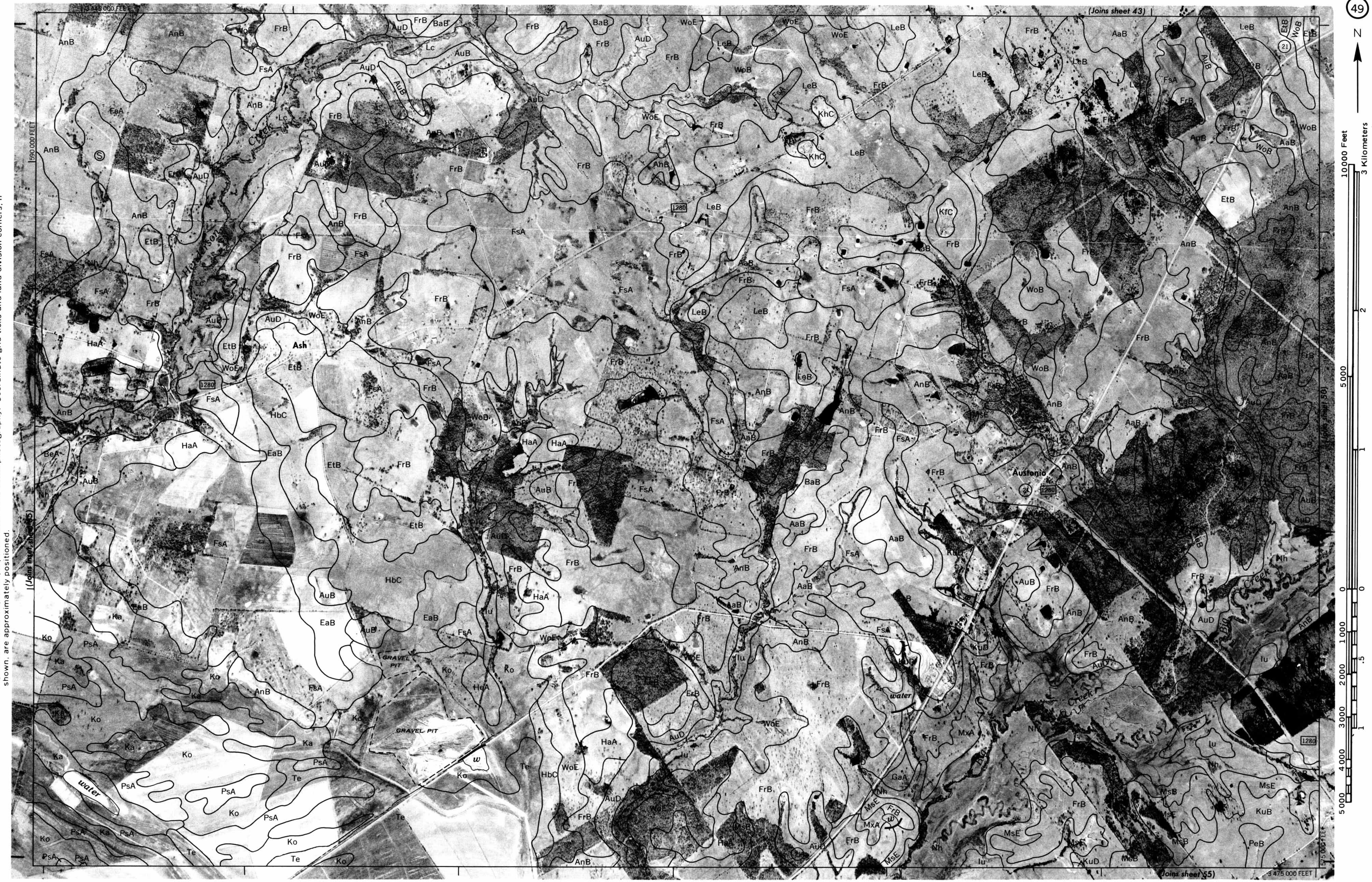
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



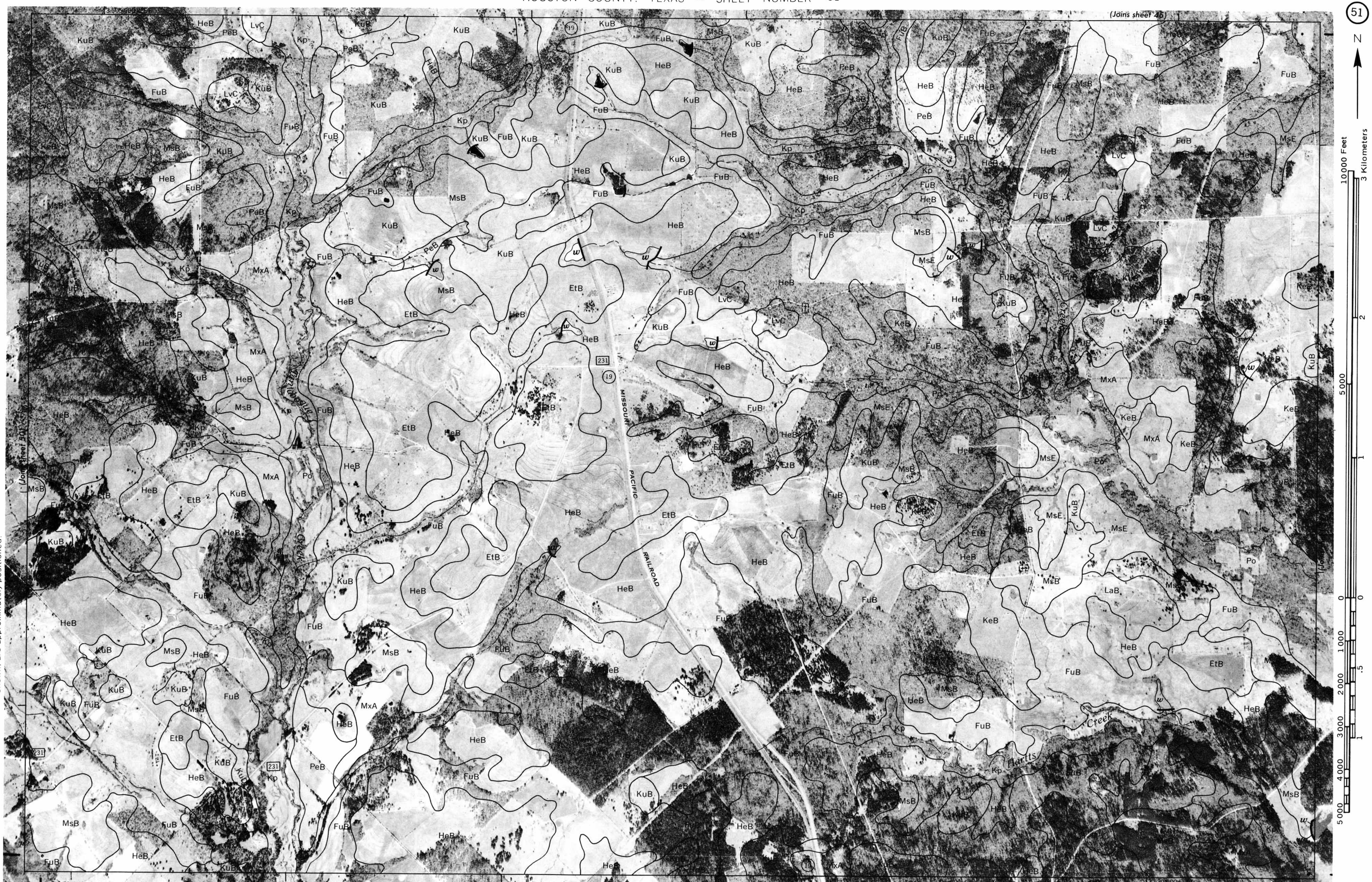
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

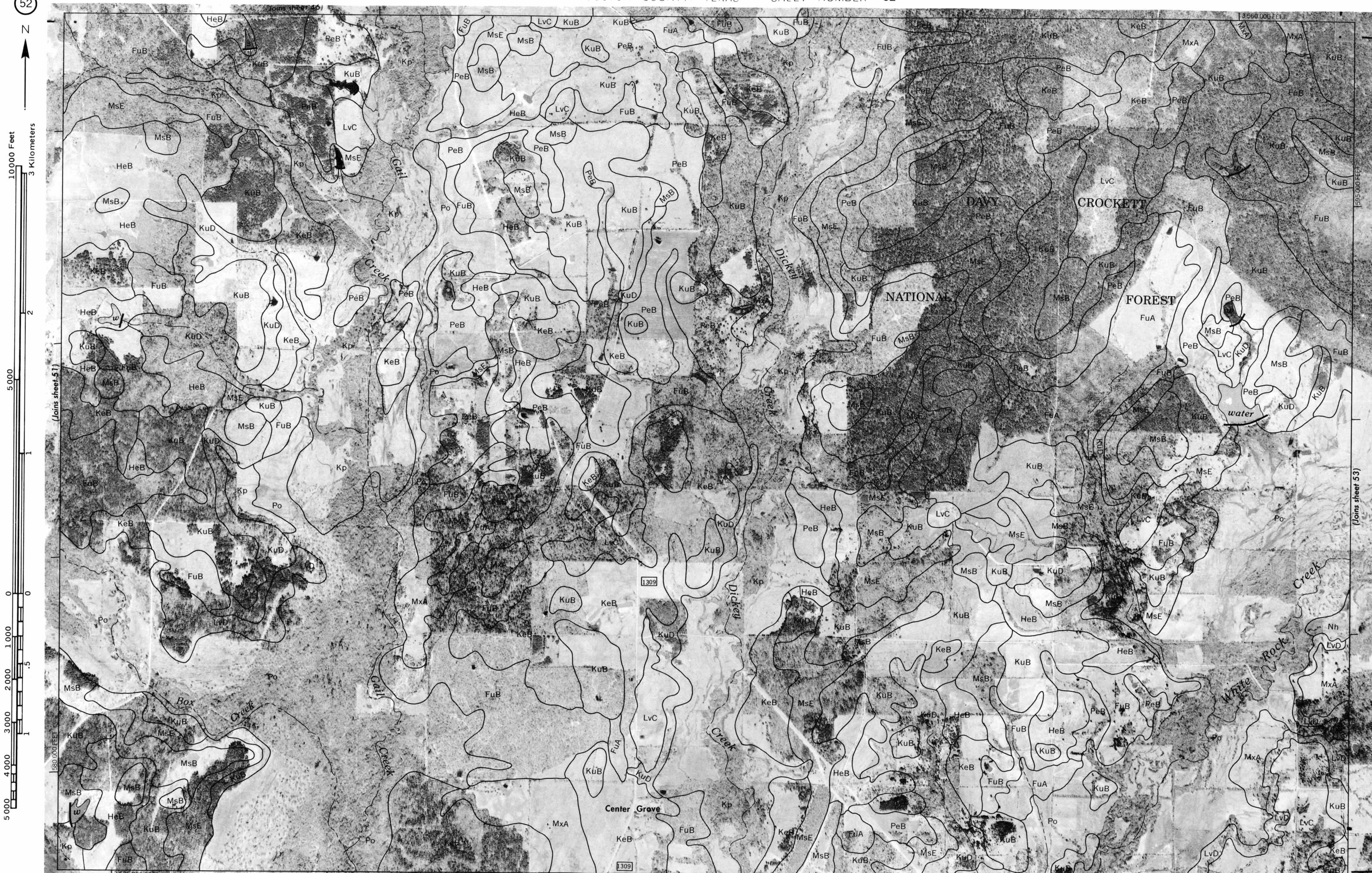


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

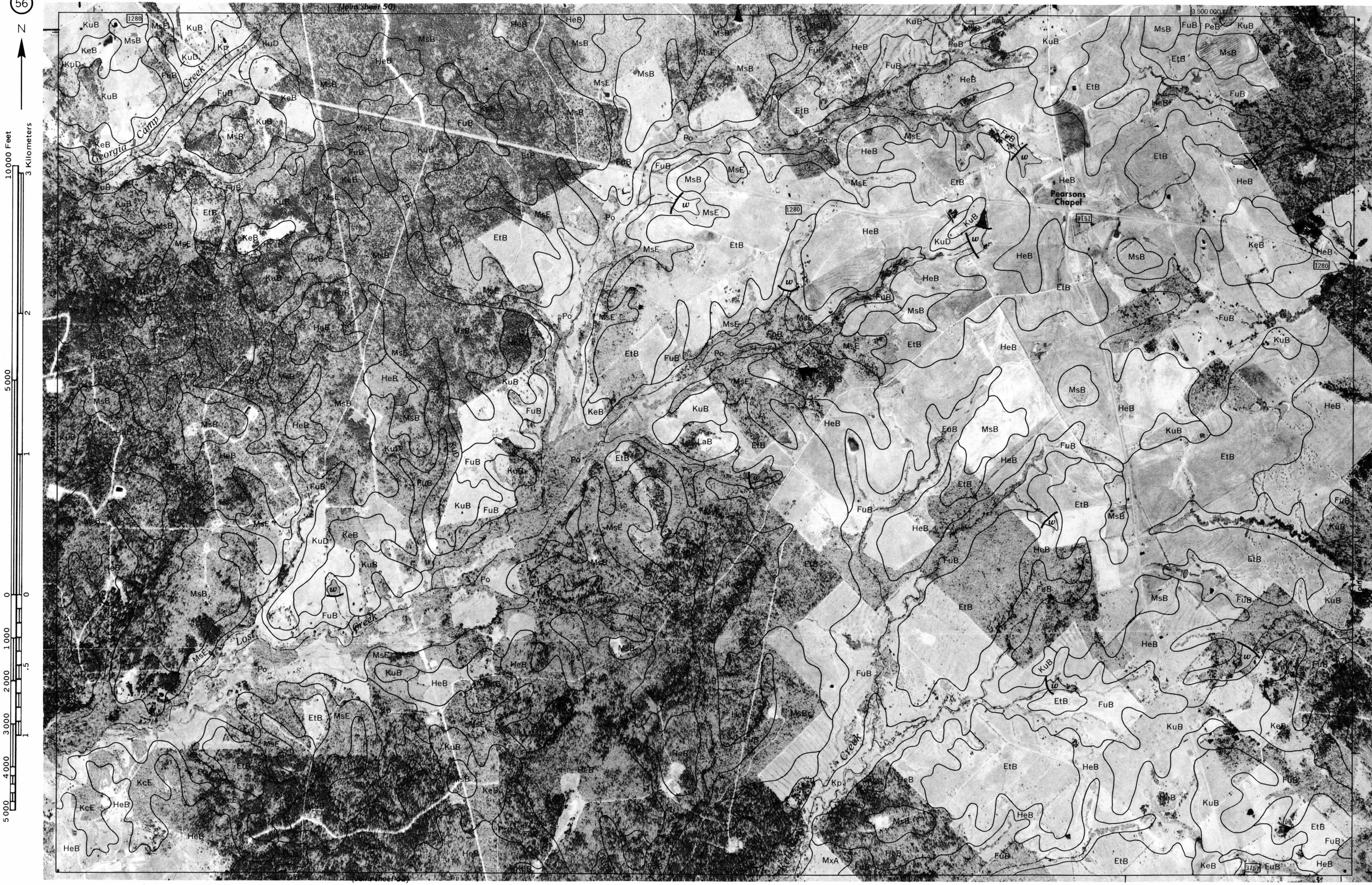


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

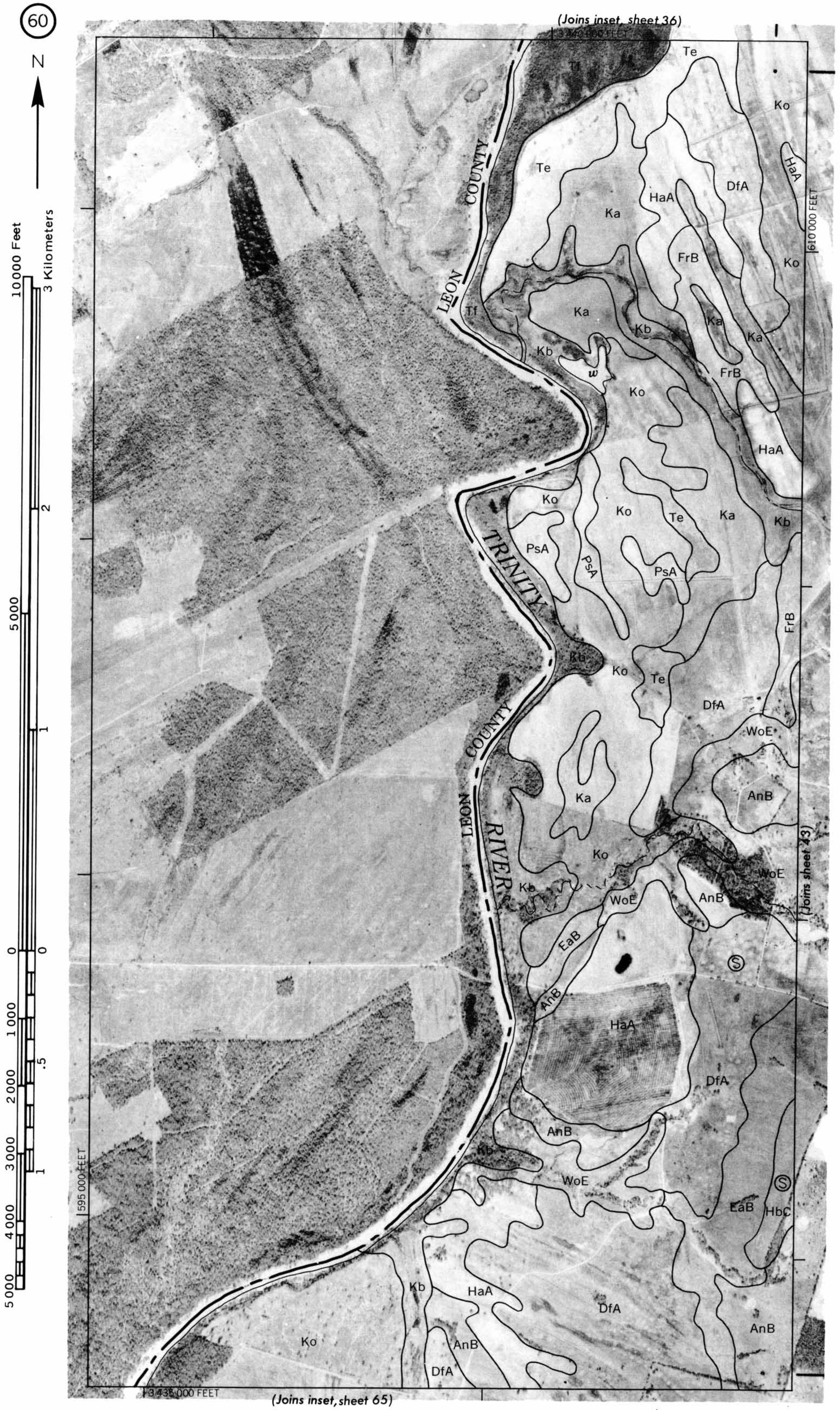


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

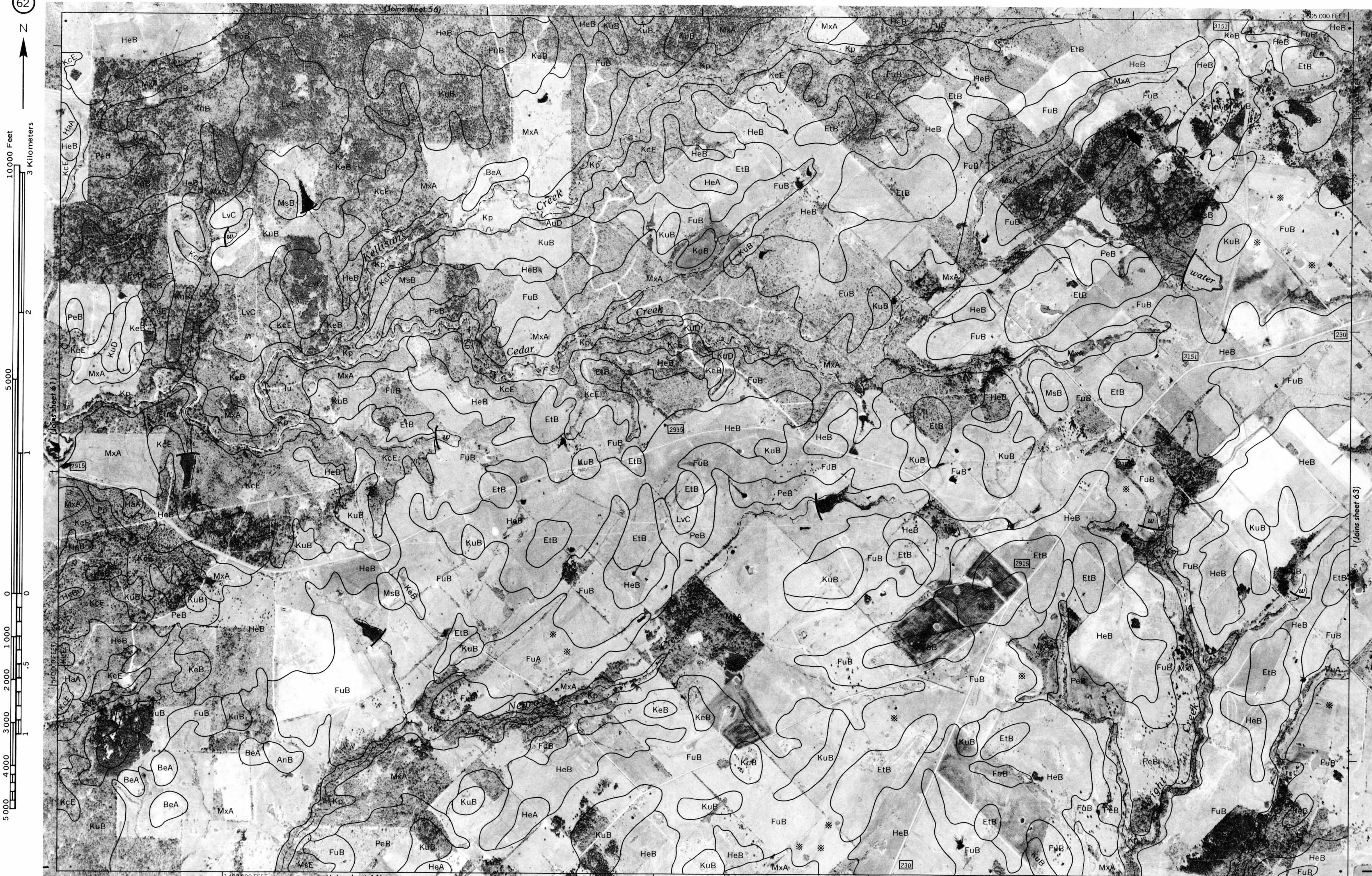
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

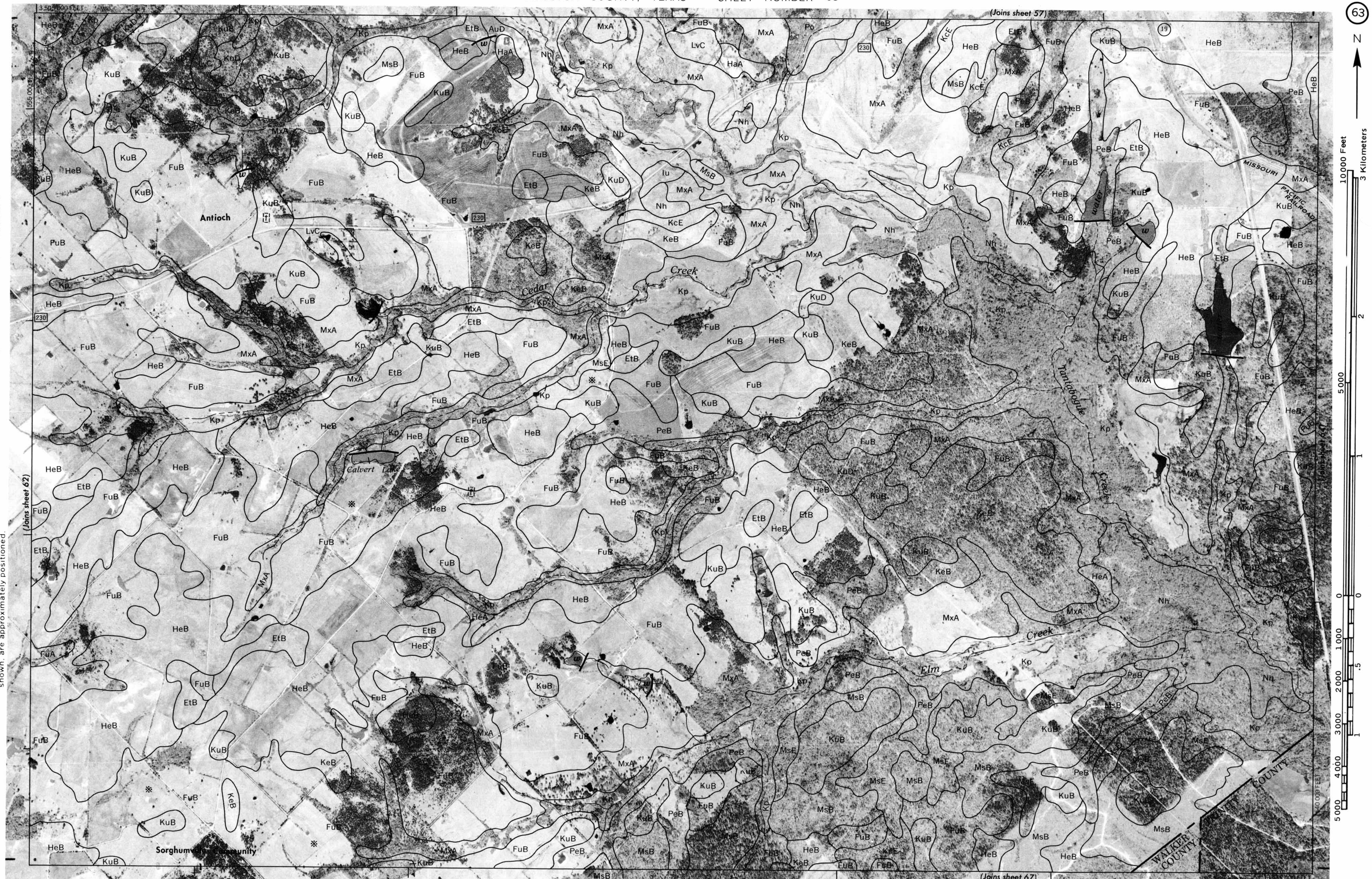


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

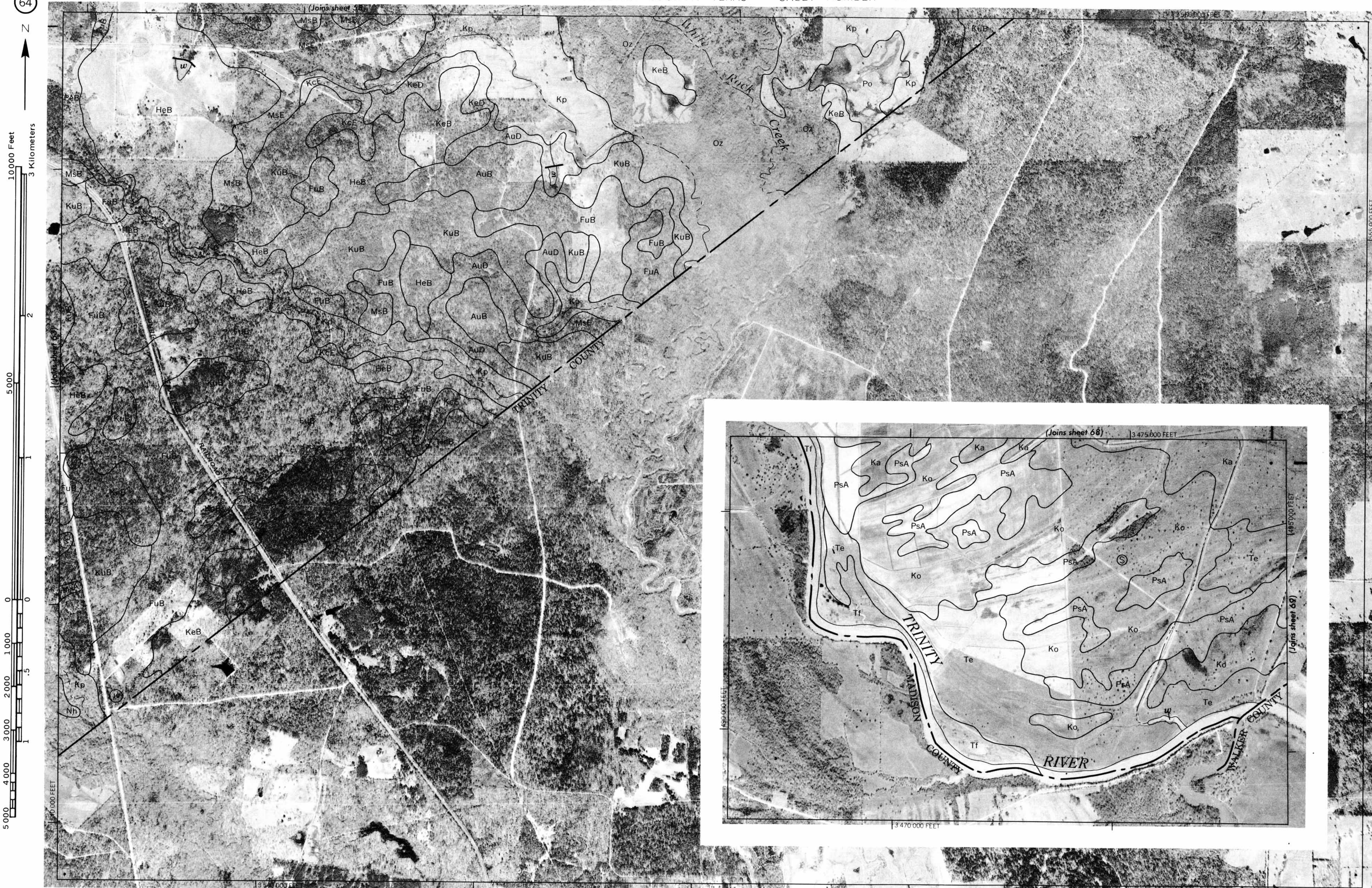
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

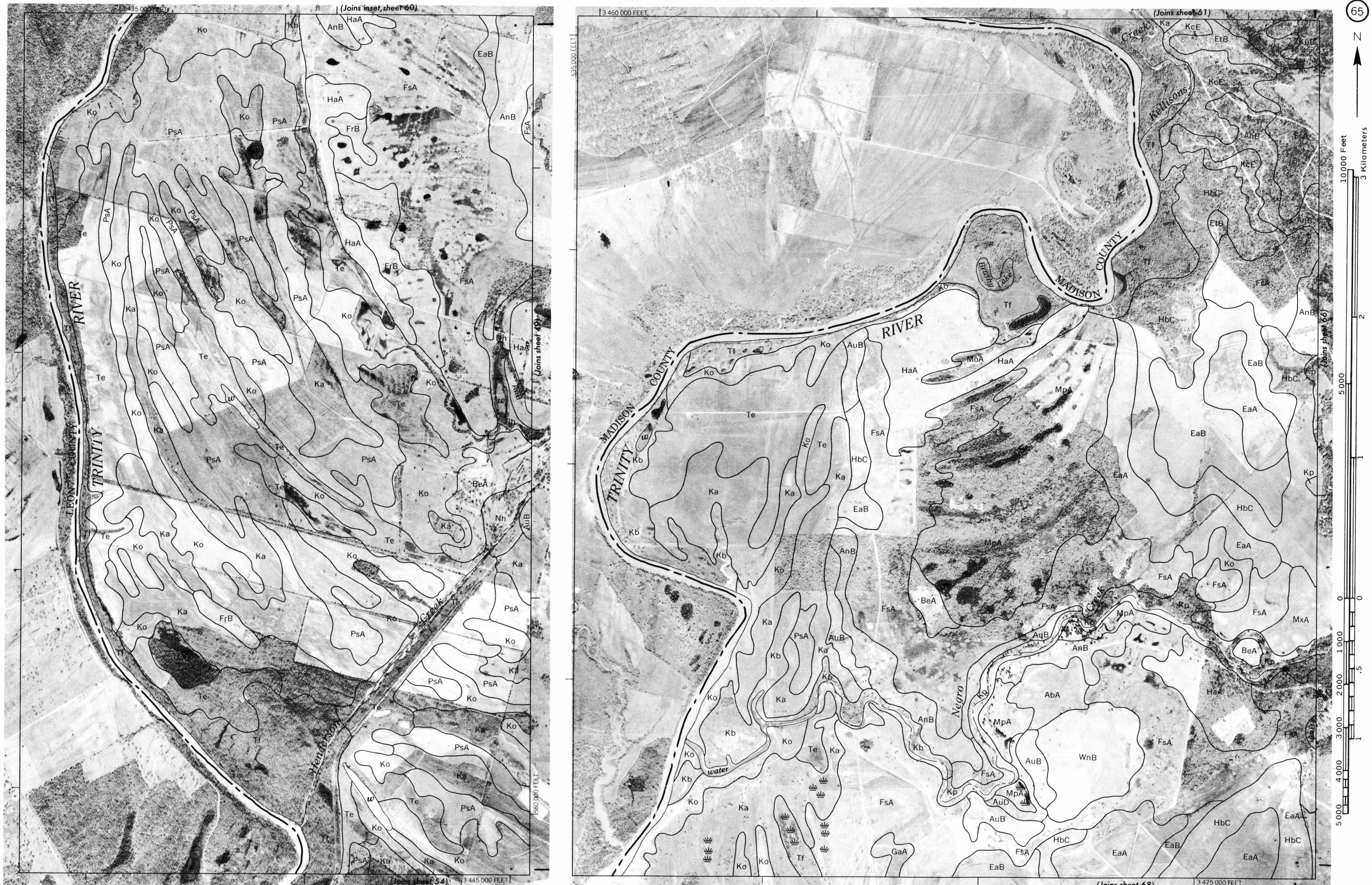


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



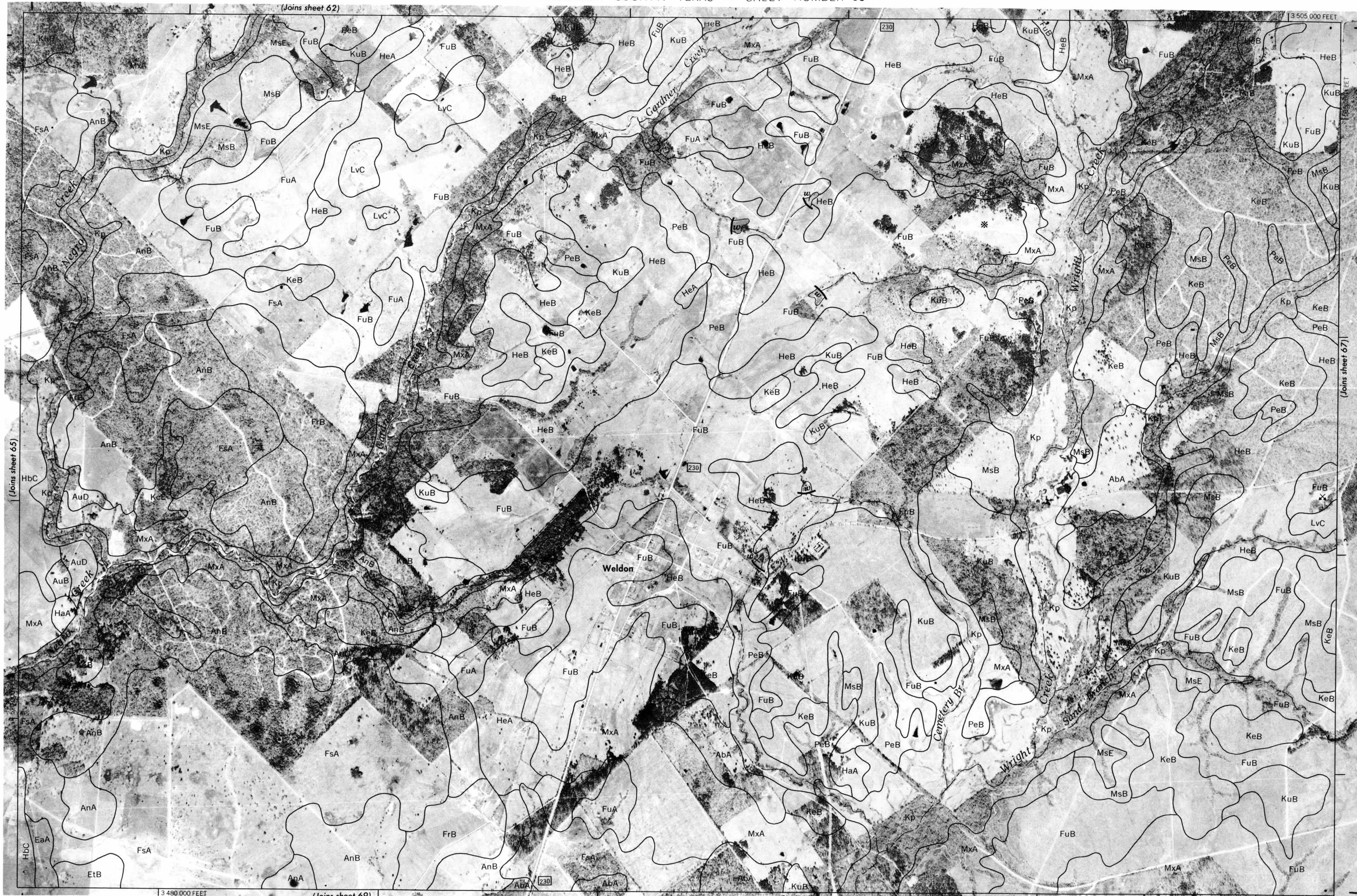
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



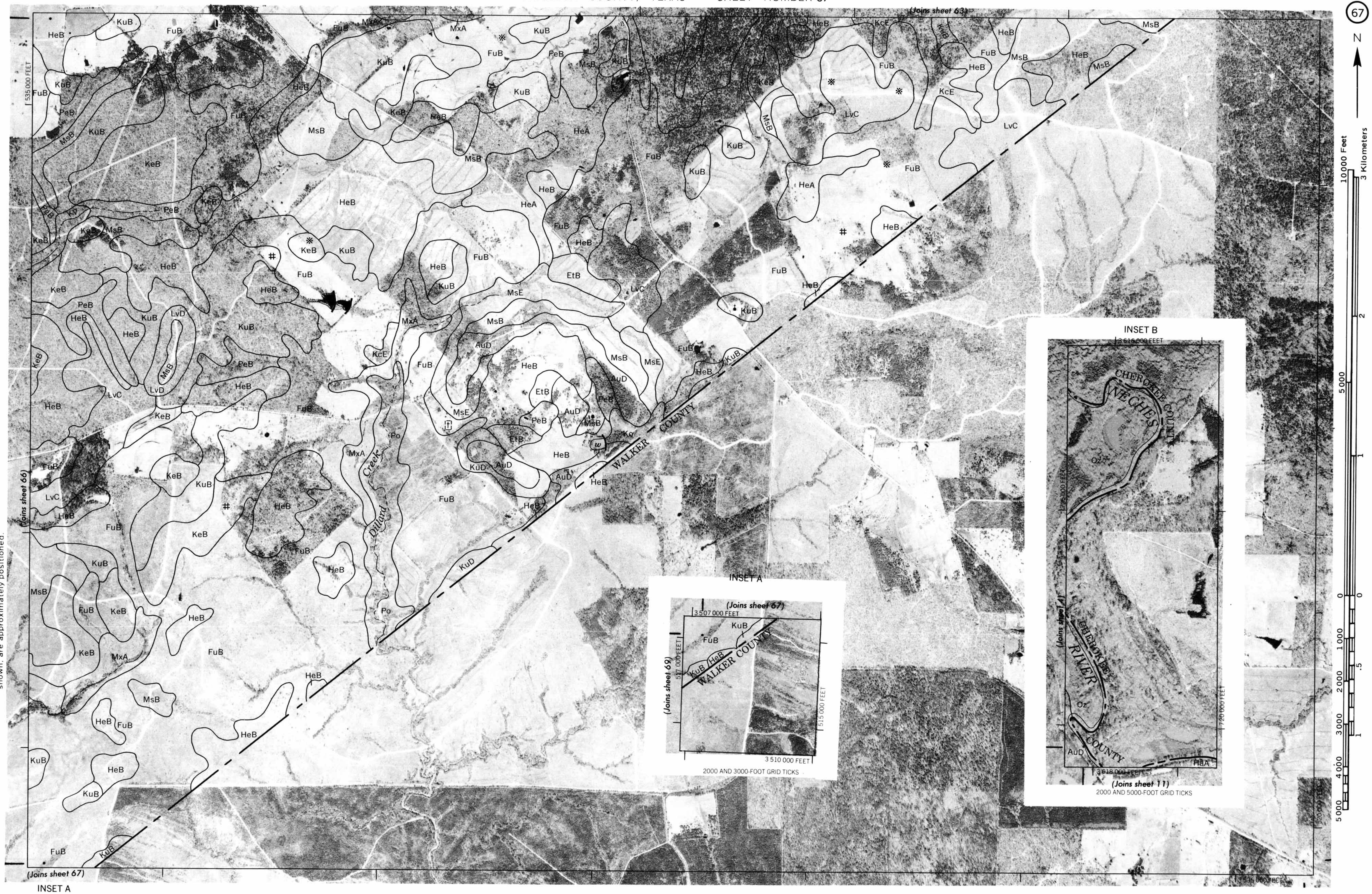
N

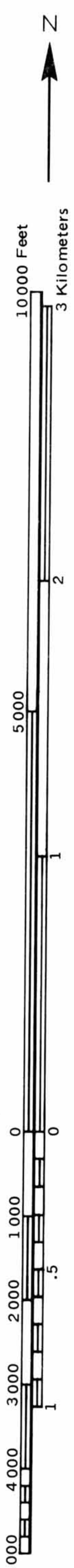
10 000 Feet
3 Kilometers



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.





This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.